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THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station — Beltsville, Maryland
Volume 33 — February 15, 1949 — Number 2

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NOTES ON CURVULARIA SP. ON GLADIOLUS, WITH FIVE NEW DISTRIBUTION RECORDS

Donald P. Limber

Since Magie[1,2] reported Curvularia sp. as new on gladiolus in Florida in 1947, Plakidas[3] has noted its presence in Mississippi. Five new locations can now be added to the known distribution of this disease. Four of these records have been contributed, generously, by the workers named below.

Dr. A. A. Foster[4] found Curvularia on gladiolus at Farmingdale, Long Island, New York late in June 1948. The infected plants were grown from cormels of the variety, Vredenburg. The stock had come from the state of Washington originally, but had been grown on Long Island for several years. Although the disease was serious in this planting of cormels, it could not be found on a planting of small corms from the same lot which were grown in another field. Possibly this is explained by the fact that the small corms were given a mercuric chloride dip while the cormels were untreated. As Foster suggested, other factors such as possible difference in susceptibility between corms and cormels, and the different locations where the two lots were grown must be considered.

Later in the season plants from cormels of the variety, Picardy, planted near the infected variety, Vredenburg, developed rather severe symptoms.

A scattering of lesions was found through a ten-acre planting of Picardy corms at a distance of one half mile from those above, but belonging to the same growers. Despite warm humid weather the disease failed to spread in this field,and by cutting time it was impossible to find lesions.

Dr. J. M. Jenkins, Jr.[5] found Curvularia in New Hanover County, North Carolina in July 1948. He collected it again in August and September in New Hanover and Pender Counties. The infections were scattered and did

1 Magie, Robert C. Curvularia spot, a new disease of gladiolus. Plant Dis. Reptr. 32: 11-13. 1948.

2 _____. Curvularia and other important leaf and flower diseases of gladiolus in Florida. Florist's Exchange & Hort. Trade World 60: 12, 1 illus. 1948.

3 Plakidas, A. G. Curvularia spot of gladiolus from Mississippi. Plant Dis. Reptr. 32: 449. 1948.

4 Associate Professor, Department of Plant Pathology, Cornell University.

5 Horticulturist in Charge, Vegetable Research Laboratory, North Carolina Agricultural Experiment Station, Wilmington, North Carolina

not cause much injury as far as could be determined. Both leaves and flowers were infected.

In contrast to the experience at Beltsville reported below, Florida-grown planting stock showed infection in North Carolina. Dr. Jenkins states, "In August 1948 we made a small planting of Picardy gladiolus which had come from Florida. We found Curvularia on the leaves of these plantsin October."

Dr. W. D. McClellan[6] states that Curvularia was found on gladiolus at Beltsville, Maryland, on October 12, 1948. Only a few lesions were present. "They were on the variety, Picardy, that we had been growing here at Beltsville for several years. In adjoining rows, there are some plants of gladiolus, varieties Picardy and Maid of Orleans, sent to us from Florida this past spring. No Curvularia was observed on these plants."

A report of the presence of Curvularia on gladiolus in Michigan has been supplied by Dr. Ray Nelson[7]. He states that the disease was first identified in their experimental plots last summer, in the variety, Myrna. The corms which produced the infected plants were reported by the supplier to be of an Illinois-grown stock.

Quoting Dr. Nelson, "The disease was serious in plots grown from untreated corms, and the stand was seriously reduced. It was well controlled by a number of experimental treatments."

Curvularia was obtained in culture from gladiolus corms grown near Norfolk, Virginia. The infected corms were collected by Geraldus Gay of the Bureau of Entomology and Plant Quarantine in October 1948.

The apparent explanation of the appearance of the disease in Virginia has been supplied by Mr. Gay. Concerning the growers of these gladiolus, he writes, "In order to get three crops from gladiolus corms every two years, they transfer them to Fort Myers, Florida, for planting. Between growing periods they place them in cold storage. They are therefore shipped to and from Florida, which could easily explain the spread of Curvularia sp. to this section."

As far as known, Curvularia sp. has not been reported on gladiolus in any other country. However, if the fungus is identified definitely as Curvularia lunata (Wakker) Boedijn, (its very close relationship to C. lunata has been pointed out by Mr. John A. Stevenson[1]), it is rather widely distributed on other hosts in at least eight foreign countries. C. lunata also occurs in the United States, in Texas, where it is said

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6 Pathologist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Maryland.

to cause black spots and black kernels of rice[7]. An earlier report of its presence on rice in Texas was made by Tullis[8].

Magie[1] isolated Curvularia from diseased corms as well as from the spikes. He does not, however, describe the symptoms. Of the three corms examined by the writer, the first did not bear distinctive lesions. There were two or three closely grouped, flattened, dirty brown, angular lesions. The largest measured not more than 5 mm. on the long axis. The spots could easily have been attributed to mechanical injury, and quite possibly that was involved. The second corm bore typical fungus lesions. These are small, circular, slightly sunken spots which measure up to 2 mm. in diameter except where greater size is reached by confluence of single spots. The color is dull brown, but may appear nearly black where conidiophores and conidia are present. The margin is somewhat lighter than the center. On one side of this corm the spots were closely aggregated, but on the remaining surfaces they are widely scattered. The third corm was more severely injured. A single lesion was present which measures 2.5 cm. in diameter with the center depressed to a depth of 5 mm. No conidia or conidiophores were present on the lesion, but tissue taken aseptically from the decayed tissue beneath yielded pure growths of Curvularia.

This description will undoubtedly require revision when more material can be studied, but it is hoped that it will be of assistance to those interested in gladiolus diseases.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, HOBOKEN, NEW JERSEY

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7 Martin, A. L. and G. E. Alstatt. Bull. Tex. Agric. Exp. Sta. 584, 14 pp., 2 illus. 1940.

8 Tullis, C. E. Tech. Bull. U. S. Dept. Agr. 540, 11 pp., 4 illus. 1936.

SUCCESSFUL SPRAY CONTROL OF ALTERNARIA BLIGHT OF PETUNIAS GROWN FOR SEED IN COSTA RICA

Frederick L. Wellman

Strains of petunia (Petunia hybrida Vilm.) have been developed by breeding techniques from which can be secured highly valued progeny. Such flower characters as doubleness, size, special conformation, fringed and ruffled edges, and colors are combined through genetic handling, and result in plants that are much prized ornamentally. The breeding is carried on under intensive conditions, in a small area, and under continuous attention.

To obtain the best seed production requires great skill and a long period of study and training. When a disease appears and threatens destruction of such a valuable and specialized seed crop it requires immediate consideration. Furthermore, when a method of control of the disease is found it is of importance. This has been the experience of Mr. Claude Hope working in the tropics, producing special petunia seed for commerce at Finca La Dominica, near Turrialba, Costa Rica. His work was of so much interest to me, as it dealt with tropical plant disease problems, that with his cooperation a report was prepared of some of his studies, and is presented herewith.

Petunias have been grown for several years by Mr. Hope for breeding stock. Several diseases of minor importance have attacked the plants and in the main were controlled by cultural methods and hygiene. The most serious trouble started early in 1947 as a leaf blight, and by April caused much killing of foliage including stems and flowers. By mid June Mr. Hope was engaged in experimental work with knapsack sprayers to check the trouble.

Identification of the Organism and Disease Description

The causal organism was identified from examples of the diseased plants that were secured from Mr. Hope. Simple cultures and inoculations were made, and materials were also incubated in moist chambers. The disease organism was examined microscopically and found to be a strain of the fungus Alternaria tenuis Nees. Both mycelial and spore characters and measurements were all found to be well within the limits of that species as described in the recent critical study of it by Paul Neergaard in his book, "Danish species of Alternaria and Stemphylium, taxonomy, parasitism, and economical significance", published in Copenhagen, 1945.

I do not recall having seen any past report of an Alternaria disease of petunias, and search of the available literature at the Inter-American Institute of Agricultural Sciences disclosed nothing of that sort. Neergaard does mention in his book that he had at one time recovered spores

of A. tenuis from petunia seed he had obtained from Germany. This present report of our work here in Costa Rica may be the first instance of the recognition of Alternaria as the cause of a petunia blight.

The symptoms of the disease were observed as follows. Within two days after healthy petunia leaves were inoculated with drops of spore suspension, small infection spots were visible on the leaves. These spots expanded quickly, and in a week's time were from 7 to 27 mm. in diameter. Where several spots occurred close together they coalesced readily. Color of the spots was dark brown, they were well rounded in shape, and had faint concentric markings on the upper surface. In some cases the whole leaf became involved from such a spot, but there was no general leaf drop caused by infections. These dead leaves hung on, and in the most serious cases the disease spread to the petiole and finally into the stem. The stem infection subsequently killed the branch attacked from girdling and collapse of the part above the girdled portion. This disease progress required about 20 days in a protected location, under the existing experimental conditions. Within a month's time the disease caused complete killing of some of the large plants.

Natural infections occurred on stems, causing rather small elliptical gray brown lesions. This was repeatedly proved by recovery of A. tenuis spores from such lesions. In all the instances studied by me, however, the stem lesions did not result in the girdling and dieback of branches, such as that which followed infection from original leaf lesions that attacked the stems by way of the leaf petioles. It was also noted that natural infections did not occur on the younger, vigorously growing plants. It was only when flowering started and seed setting advanced that blight became evident.

Exposure likewise sppeared to have some effect on blight occurrence. The greatest part of the petunia breeding material was grown under narrow sheds of roofing to better control specialized handling. In a number of instances a few plants of certain of the clones were planted in the open, and these even when in full flower, were always almost entirely free from Alternaria attack. This was true, moreover, when the healthy open grown plants were within a few feet of diseased plants of the same clone that became diseased under protected conditions. Both sets of plants must have received equal amounts of natural inoculum. All plants were given approximately the same amount of fertilizer, and were grown in prepared soil from the same source.

Methods of Control

The first methods of control used were those of practical field hygiene. These, however, were soon found to be inadequate. After that sprays were tried, using at first a copper fungicide (Acme Kopper King). This, it was quickly seen, was injurious to the plants and also did not give sufficient

control of the disease. It was then that Mr. Hope secured supplies of some of the organic and other newer fungicides and started comparative studies of their efficacy. Plants were grouped into lots of 12 to 24 each, replicated, and untreated lots were also set aside.

Table 1. Results after nine weekly spray applications on seed-bearing petunia plants for control of blight caused by Alternaria tenuis, from data secured in October 1948, Turrialba, Costa Rica.

Treatment	Estimated percent of foliage free from Alternaria blight					
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
Untreated	2	2	3	2	5	3
Fermate	97	80	88	90	95	--
Bordeaux mixture	65	70	65	--	75	60
Parzate	85	--	90	--	98	--
Zerlate	77	60	85	85	95	--
Acme Kopper King	10	10	15	20	35	--

Table 2. Results after four weekly sprayings on petunia plants taken after experiments were completed that were reported in Table 1. Plants were selected for similarities in size, vigor and disease, regrouped into other plots, treated with sprays indicated and data secured in November, 1948.

Treatment	Estimated percent of foliage free from Alternaria blight					
	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6
Untreated	40	20	15	25	--	15
Parzate	97	60	--	--	90	80
Fermate	97	65	88	95	93	80
Zerlate	90	35	40	--	--	--
Dithane	--	35	--	35	--	--

Spray applications were made weekly, using 5-gallon knapsack sprayers. Materials employed were Bordeaux mixture of standard 5-5-50 strength, Fermate, Parzate, Zerlate, Dithane, and Acme Kopper King. Dilutions were, if the material was powder, at the rate of 2 pounds to 100 gallons of water, and if liquid, 2 quarts to 100 gallons of water. A resin spreader sticker was used in all cases, and a small amount of wettable sulphur was included with Fermate. The results from these sprays are presented in the accompanying Tables 1 and 2.

It was found, as the data indicate, that Fermate and Parzate were the most satisfactory fungicides used. Not only did Kopper King and Bordeaux Mixture give inadequate control of the disease, but in addition they were both injurious to the petunia plants. They caused stunting of foliage and marked effects on flowers and appeared to reduce setting of seed.

Tests were also made studying recovery effects after copper injury. Badly injured plants that had been sprayed for five months or more with Kopper King were separated into two groups. One lot that was sprayed with Zerlate showed considerable recovery from toxic effects within a month's time. However, the other lot sprayed with Fermate showed even better recovery. In general it was apparent that plants sprayed continuously with Fermate and Parzate were more vigorous than any of those in the spray trials.

COMPLEMENTARY CROPS DIVISION, TECHNICAL COLLABORATION BRANCH, OFFICE OF FOREIGN AGRICULTURAL RELATIONS, U. S. DEPARTMENT OF AGRICULTURE. (HEADQUARTERS, INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES, TURRIALBA, COSTA RICA.) December, 1948

NEW DISEASES OBSERVED IN NEBRASKA ON SAFFLOWER

C. E. Claassen, M. L. Schuster, and W. W. Ray

Since 1942 a breeding project has been in progress on safflower (Carthamus tinctorius L.) at the University of Nebraska. A small commercial acreage of this oilseed crop has developed in Nebraska and a few other States (1). Since the initiation of experimental work on safflower several diseases have caused considerable damage to experimental, and in some cases to commercial plantings.

Rust. Rust caused by Puccinia carthami Corda was first observed on breeding material in 1947. A trace of rust was observed on some greenhouse plants during the winter of 1947-1948. The experimental field plots at Alliance and Scottsbluff in 1948 were located in adjacent fields to the 1947 plots. Rust appeared in July at both locations. By September the lower sides of the leaves of susceptible varieties were almost completely black with telial pustules. Most of the selections and introductions were found to be susceptible to this rust. Immune plants were observed in introductions from Rumania and Turkey. Individual plant selections from "Yenice 1813", an introduction from Turkey, produced progeny that were resistant, susceptible, or segregating. Resistance to this rust appears to be dominant. Several lines selected from an Egyptian introduction were found to have moderate resistance to rust.

Conners (2) described this rust occurring on experimental plantings of safflower in Canada in 1942. Results from his tests showed that the fungus was probably introduced and spread to new areas in Canada by seed. This also appears to be the most logical conclusion concerning the appearance of safflower rust in Nebraska. Conners also noted that varieties differed in susceptibility to the rust organism.

A survey of commercial safflower fields in Nebraska, Colorado, North Dakota and Montana was made during August. No rust was found in fields of Indian safflower although this variety in experimental plots is very susceptible. Traces of rust were found in several fields of a new variety, Nebraska 852. This variety in experimental plots is less susceptible than Indian. The Nebraska 852 seed used for commercial plantings in 1948 was grown on the Box Butte Experimental Farm, Alliance, Nebraska. Indian safflower used for seed has not been grown on the station grounds since 1945. The increase field of N-852 did have some rust in 1947. The seed was treated with New Improved Ceresan before planting. From these observations it appears that rust is spreading by seed and that New Improved Ceresan is not entirely effective in its control.

Leaf Spot. Leaf spot caused by an Alternaria species, which is similar in appearance to that described by Rodigkin (3) as Macrosporium carthami

Rodighin has been observed on safflower each year since 1942. Savulescu (4) working in Rumania has published a detailed description of the Macrosporium species causing this disease and the symptoms produced.

Marked differences in the degree of susceptibility occur in experimental material. Some completely spineless lines from "Yenice 1813" are very susceptible. Plantings made on dry land are usually not damaged by this disease even though the variety grown is susceptible. Irrigated plantings in Nebraska occasionally have been very seriously damaged during seasons with high rainfall and heavy dews. In 1945 this disease killed all plants in one irrigated field shortly after flowering.

Root Rot. A root-rot disease (causal agent not yet determined) was first observed in 1948 in Scottsbluff plots and in one dry land commerical field. A Phycomycete, and species of Fusarium and Alternaria were commonly isolated from diseased roots. Pathogenicity tests have not yet been attempted. Plants began to wilt and die when about six inches in height. Plants of susceptible varieties may succumb to the root rot at any stage of growth.

The first above-ground symptom of diseased plants usually is a change in leaf color from dark green to light green. In young diseased plants this symptom is soon followed by wilting. Often these symptoms occur simultaneously. Symptoms of diseased plants at the blossom stage or at later stages of growth are usually limited to changes in leaf color from dark green to lighter shades of green until plants finally die. Diseased plants usually die within five to ten days after first symptoms occur. The outer appearance of roots and lower portions of the stems from diseased plants varies in color from brown to black. The inner portions of diseased roots are usually light brown in color.

There are very distinct differences in degree of resistance to this disease. All introductions from India and Africa are 50 to 100 percent susceptible. Introductions from other countries appear to have high resistance. Eighty percent of the plants in one six-acre field of Indian safflower were killed by this disease during the month of June. Root rot of safflower can easily be confused with drowning of plants caused by excess moisture. All varieties of safflower are subject to drowning when plants are flooded for more than 24 hours.

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UNIVERSITY OF NEBRASKA, LINCOLN

TOBACCO DISEASES IN VIRGINIA, 1948

S. B. Fenne

Tobacco started off very well in the early spring. However, extremely dry weather occurred soon after transplanting and for a time, in some counties, prospects for a good crop looked bad. However, by harvest time tobacco had recovered and a good average yield was produced.

Downy mildew, Peronospora tabacina, was first reported in Halifax County on April 19. However, it is likely that the disease was present a week earlier. By April 22, blue mold was found generally distributed in most counties in the flue-cured area. Hot, dry weather occurred on the 22d and after that date the disease developed slowly.

Demonstrations in the use of Parzate and Fermate were set up in nine counties. In general, farmers who used Parzate liked it very much but only a few of them considered it superior to Fermate. More people used Fermate dust this year than in former years. Where the dust was properly applied, good results were obtained. However, it was found that greater care is required to secure good blue mold control when using dusts than when spraying. Plenty of Fermate was available in the tobacco area this year. Over 50 percent of the tobacco growers in the State applied blue mold control measures. As a result, plenty of good disease-free tobacco seedlings were available at the proper time for transplanting.

Blackshank, Phytophthora parasitica var. nicotianae, continued to spread throughout the State. It appeared in Sussex and Greeneville Counties for the first time this year. At the present time, blackshank is found in 14 counties. In addition to spreading to two more counties, the disease was found on many additional farms in counties from which it had been previously reported. Result demonstrations were set up using blackshank-resistant (Vesta) tobacco. In general, the Vesta strains proved to be very resistant to blackshank. They yielded well and produced tobacco of good quality that cured well and sold well on the market.

Bacterial wilt, Bacterium solanacearum, did not spread so rapidly as in previous years. However, it was found in many of the flue-cured counties and presented a definite problem unless the proper control measures were applied. Oxford 26 continued to do well on Granville wilt

infested soil. Farmers have learned to plant this tobacco a little closer together and appear to be very well satisfied with the yield and quality.

Sore shin, Rhizoctonia solani, appeared to be on the increase to some extent. It was found generally distributed throughout the tobacco area and in some cases caused confusion among farmers because of its similarity to Granville wilt and blackshank.

Southern stem rot, Sclerotium rolfsii, was frequently found in the far eastern tobacco area, especially on light sandy soils. In many cases, stem rot was confused with sore shin. In the past, stem rot has not been considered to be an important tobacco disease in Virginia.

Rootknot, Heterodera marioni, was much more prevalent this year than in the past several years. This is the first year that large numbers of farmers have sent in specimens of roctknot-diseased tobacco.

A root rot-disease complex was observed in many tobacco fields. In fact, much of the trouble with poor growing tobacco may be due to a combination of injury by meadow nematodes and root rot.

Mosaic and ringspot [virus diseases] were found generally distributed throughout the tobacco area. Ringspot was especially severe in the dark and fire-cured areas.

An unusual amount of hollow stalk, Bacillus carotovorus [Erwinia carotovora] was found. Many farmers were very much excited about what appeared to them to be a new disease because of the complete destruction of individual plants. In most all cases, it was shown that farmers topped and suckered plants during periods of high humidity. The actual loss resulting from hollow stalk was negligible.

A considerable amount of loss occurred from "firing" caused by blackfire [Pseudomonas angulata] and brown spot. Most of the blackfire occurred in the mountainous areas of Southwest Virginia on burley tobacco; however, it was fairly general in the flue-cured tobacco, also.

VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG

OCCURRENCE OF ETCH ON FLUE CURED TOBACCO IN NORTH CAROLINA

E. L. Moore, G. B. Lucas and E. E. Clayton

One plot of Variety Oxford 26 showed symptoms indicative of a virus at the Tobacco Branch Station, Oxford, North Carolina in 1948. The symptoms were first noticed around June 10 when the plants were about 15 inches tall. A mottling suggesting mosaic occurred on younger leaves in the upper half of the plant. More than 50 percent of the plants of a 300 plant plot were affected. Two weeks later various shaped necrotic areas had developed in the leaves. The disease was not found anywhere else in the 8 1/2 acre breeding nursery, and it did not spread from this small area in one corner of the field.

About July 10, leaf samples were sent to H. H. McKinney, Beltsville, Maryland. He identified the virus as etch by cross inoculation tests. So far as is known this is the first appearance of this virus disease in North Carolina.

DIVISION OF TOBACCO, MEDICINAL AND SPECIAL CROPS AND NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION

VERTICILLIUM WILT OF COTTON FOUND IN GEORGIA

B. S. Hawkins and B. B. Higgins

In August 1948, in company with Dr. H. D. Barker, some ten cotton fields of Fayette County were visited. At one location several plants were found which showed symptoms typical of Verticillium wilt. These plants were growing on heavy soil near a barn. Affected plants showed only slight stunting and little, if any, reduction in yield. However, they had shed a number of leaves and the remaining leaves showed various degrees of mottling. When the plants were cut near the ground level the stalks showed some internal blackening occurring as streaks scattered throughout the vascular system. There was no blackening of the cambium area as occurrs in plants infected with Fusarium wilt.

In early September, similar diseased plants were found in Spalding County. These plants were growing on land where a house had formerly been located. In October, diseased plants were also found in a fertile, rather poorly drained field located in Gordon County.

Plants from the three locations were taken to the laboratory where isolations were made from the discolored tissues. Verticillium, which

agreed with published descriptions of V. alboatrum, was obtained from every plant. Subcultures from each location were sent Dr. C. D. Sherbakoff who reported the fungus identical with the V. alboatrum isolated from cotton in Tennessee.

At each location the disease made no appreciable reduction in yield as the infected plants were not appreciably stunted in size and remained alive, producing a satisfactory crop. The number of infected plants was small at all locations. This is believed to be the first report of Verticillium wilt on cotton in Georgia.

GEORGIA AGRICULTURAL EXPERIMENT STATION, EXPERIMENT

DOWNY MILDEW OF OATS IN INDIANA

Ralph M. Caldwell, T. R. Stanton, and R. R. Mulvey

Downy mildew of oats (Sclerospora macrospora Sacc.) occurred for the first time in Indiana in nursery plantings of spring oats on the Purdue Soils and Crops Farm, Lafayette, Indiana, in 1946 and again in 1947. In both years the causal fungus was identified by recognition of oospores in the leaf, glume and rachis tissues. The disease did not occur in 1948 on this farm although oats were grown on a range of plots adjacent to that on which the disease had occurred in 1947.

In 1946 the infection was light but rather general over an entire yield-testing range 160 feet wide and 1200 feet long. The infection was somewhat heavier in the lowest elevations. Infected tillers were distinguished in 1946 by late maturity, flag leaves showing a mottled green color, and exceptional height which caused the green, infected panicles to stand conspicuously above the normally ripened panicles. The rachis and glumes of infected panicles were much distorted. Although the infection was conspicuous yield losses were insignificant in 1946. Oats on the other areas of the same farm were not infected.

In 1947 the disease manifested itself in an entirely different pathological picture. The disease was rather closely confined to the most poorly drained areas of the oat breeding nursery plot. Infection of plants in these areas approached 100 percent. The most severely affected plants were extremely stunted, reaching a height of only 10 to 15 inches as compared with uninfected plants which were 36 to 48 inches tall. A large majority of such plants failed to head. Where panicles were produced the distortion, characteristic of the disease, appeared. Almost complete yield losses occurred in the central parts of the infected areas. The infected plants showed markedly less severe symptoms at the margins

of such low areas, with infection dropping to zero over a distance of 50 to 75 feet.

These are the only two instances in which downy mildew of oats has been recognized in the State of Indiana. Both years were characterized by unusually moist soil conditions. In 1946 the oats were grown on land having better natural drainage than that on which the disease occurred in 1947. This may account for the extremely diverse manifestation of symotoms in the two years. The 1948 season, in which the disease did not occur on low lying soil adjacent to the severe infection of 1947, was relatively dry during the seedling and jointing stages of growth of the oat crop.

PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION AND U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

DOWNY MILDEW OF OATS IN IDAHO

T. R. Stanton, H. A. Rodenhiser and Harland Stevens

Downy mildew (Sclerospora macrospora Sacc.) was found on oats grown under irrigation at Aberdeen, Idaho, in July, 1948. Diseased plants of Overland oats were observed first in a 3-acre field, previously in grass as a pasture, on a small farm just south of Aberdeen that has been leased for some years by the Soil Conservation Service, U. S. Department of Agriculture. The infected oat plants were stunted and their panicles were variously abnormal. The diseased plants were fairly evenly distributed throughout the field except that they were more common in the lower portions where excess irrigation water collected. In some of the lower areas, upwards of 10 percent of the plants were infected.

At about the same time, numerous downy mildew-infected plants were found also in a rather late-sown oat breeding and viability nursery on the Aberdeen Branch Station of the Idaho Agricultural Experiment Station. The infected plants could be found rather easily, and they did not seem to occur more frequently in any particular type or variety of oats. This area was in small grains in 1947.

Specimens of the diseased plants were sent to Aaron G. Johnson, Plant Industry Station, Beltsville, Maryland, who found numerous characteristic oospores of downy mildew in the leaf blades, sheaths, and glumes.

Other fields of oats in the vicinity of Aberdeen were inspected but no downy mildew-infected plants were found in them.

DIVISION OF CEREAL CROPS AND DISEASES

SMALL GRAIN DISEASES IN VIRGINIA IN 1948

S. B. Fenne

This past year was very favorable for the production of cereals in the State. Yields and quality were generally very good. Late crops, because of unusually wet weather late in the season were harvested with a high moisture content, which made storage difficult.

Loose smuts, Ustilago tritici on wheat, and Ustilago nuda on barley, were perhaps the worst diseases in these two crops. Farmers in general were very much concerned about loose smut.

The results of last year's hot-water treatment demonstrations were outstanding. In only one of the demonstrations was a trace of loose smut found this spring. In the other demonstrations, no loose smut at all could be found.

A new variety of wheat developed by the Virginia Experiment Station, known as Vahart, seems to be highly resistant to loose smut and somewhat resistant to mildew. Because of its disease resistance and yielding ability, Vahart wheat is widely grown throughout the State.

Powdery mildew, Erysiphe graminis, was quite prevalent on wheat and barley in most parts of the State. However, because of the fact that Wong barley and Vahart, both partially resistant to mildew, are being grown widely throughout Virginia, losses from this disease were not so great as in preceding years. Scab, Gibberella zeae, was more prevalent than for some time and appeared to be especially common on the Thorne variety of wheat.

Nematodes, Anguina tritici, were found throughout the wheat growing area of the State, especially on small farms where home-grown seed is planted year after year without careful cleaning.

There was a slight decrease in the amount of black stem rust, Puccinia graminis. Glume blotch, Septoria nodorum, and leaf rust, Puccinia rubigo-vera var. tritici, were very abundant on wheat.

VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG

A LIST OF MAIZE DISEASES FROM A LIMITED AREA IN COSTA RICA

Frederick L. Wellman

A fairly large number of diseases have been observed during the last few months on maize (Zea mays L.) at the Inter-American Institute of Agricultural Sciences near Turrialba, Costa Rica. This is in the tropics, and days average 12 hours in length with a variation of 43 minutes. The observations on disease here are of preliminary nature, but deserve report at this time as they are of general interest and concern what has been seen on this crop in a location in a moist part of the tropics. The maize plots have only been grown the last few years, and are at an elevation of about 2000 feet (610 m.) and at a latitude of approximately 10 degrees North of the Equator. The plots are in small fields in different parts of a limited experimental area that is less than 10 hectares in extent. A few maize importations have been included from other parts of the world, but most of the seed came from Central America. All plants growing currently in the experimental plots show more or less serious leaf spots and other diseases of one kind or another, and it is considered that this is in part due to weather conditions in the region.

The climate at the Institute is classed as that of the humid tropics, with temperature and moisture effects that are favorable for such plant disease development. While no extensive meteorological records are yet available the following general climatic description may be given. Temperatures range from 64° to 81° F. (18° to 27° C.), with a mean at about 73° F. (23° C.). The average relative humidity is over 80 percent, and dews are almost invariable at night if there is no rain. Rainfall conditions divide the year into more or less wet and dry seasons. Monthly rainfall ranges from 4 to 5 inches (102 to 137 mm.) in February and March to from 13 to 20 inches (330 to 508 mm.) in November and December. In the last five years the mean average rainfall has been about 107 inches (2700 mm.). The period of highest precipitation is from April to December, although no month is without rainfall. The Institute is sheltered by hills so that the air is fairly still, but gentle breezes are frequent without high winds. During the period of from April to the first of January the afternoons are mostly cloudy.

Climates such as that just described are often met in the tropics. It was for this reason that the Institute initiated a program on maize to test methods for breeding to improve the crop in such a special locality. These methods are to be applied here as well as elsewhere under the relatively difficult conditions encountered.

It has become evident that some of the difficulties at the Institute are due to the presence of numerous diseases. This situation has been recognized by the breeder, Sr. Mario Gutierrez G., and a number of diseased

plant samples were referred to me for identification. Miss Lucy Hastings also helped a great deal in the identification work through her studies on seed and seedling troubles of several tropical crops including maize. Collections and observations have been made to determine what consideration should be given in the breeding program to diseases that may become limiting factors, and which are of least importance. These studies cover minor periods of time, scattered over several months, and have resulted in the list presented below.

Aspergillus spp. In the seed germination and seed treatment studies, apparently several species of Aspergillus were present causing serious effects. Seeds were badly infested, especially in seed stored for a few months. These organisms are probably one of the potent sources of reduction in germination when seeds are stored without special precautions.

Bacterium stewartii E.F.Sm. Typical symptoms of this common bacterial blight were first observed in June 1947 on maize of a sweet corn variety at the Institute. It was seen on over 80 percent of the plants in one small block, and a few were killed. Most, however, were only stunted and the leaf streaks and spots appeared of little importance. More recently the organism has been isolated from infected seed and plants, and the resulting cultures used in successful inoculation trials.

Cephalothecium sp. This organism occurred on seed samples along with Aspergillus.

Cercospora sorghi Ell. & Ev. This fungus caused a multitude of small leaf spots. Some plants were much more severely diseased than others. This is probably one of the common maize fungi in the moist tropics. It might become serious on strains of selfed and hybrid maize unless attention is paid to their susceptibility.

Cladosporium herbarum Lk. Large irregular shaped leaf spots on mature maize leaves were found, apparently due to attack by this organism. It is ordinarily considered a saprophyte or very weak parasite but seems more severe in its effects under the more severe conditions of humidity and warmth at the Institute. It should also be noted that Miss Hastings found a Cladosporium associated with seed stocks that had lost much of their viability.

Cylindrocladium sp. Spores typical of this genus were secured from moist chamber cultures of badly decayed roots from old lodged plants. The mycelium was brown in color and cobwebby in character.

Fusarium spp. Numerous cultures have been obtained showing the presence of several different Fusaria on maize. The most common of

these has short, thick macrospores, and has been obtained from weak plants, and from seeds. In a preliminary study on seeds Miss Hastings found over 50 percent of those of a sweet variety and 87 percent of those of a field variety were Fusarium-infested.

Gibberella fujikuroi (Saw.) Wr. forma Fusarium moniliforme Sheld. This organism has been seriously present in seed treatment trials. It has not been found by me at the Institute causing the typical so-called pink ear rot stage described in classical treatises on diseases caused by this organism. However, it does occur in this stage in great quantity in many other parts of Costa Rica, and it probably occurs at the Institute. In any case, the organism has been an important cause of poor seed germination, and weak and diseased seedlings. It has resulted in poor stands in the fields, seedlings with typical severe root injuries, weak and stunted plants, and has been isolated from discolored vascular tissues dissected from the bases of lodged stalks of mature plants.

Helminthosporium turcicum Pass. This fungus was found to be the most common cause of leaf spotting in the experimental plots. These spots were on matured leaves, and were the typical large elongated lesions so often described. The severity of attack varied a great deal from plant to plant; some showed marked absence of serious damage, others were badly attacked. It was uniformly especially severe on a number of strains of USA-grown maize that had been recently introduced because of their high yielding characters.

Penicillium spp. Species of fungi of this genus occurred frequently on seed. These may be another contributing factor to rapid loss of germination of seed stored under humid tropical conditions.

Physoderma zeae-maydis Shaw. The typical well known brown spot on leaves and leaf sheaths caused by this organism is common at the Institute. Counts in three fields showed that about 71, 82, and 83 percent of the plants in those experimental plots were diseased. The effects on individual plants varied with regard to severity. Although it was present it appeared to cause little damage to the majority of diseased plants. About 5 percent of these showed a large amount of disease, and about 1 to 2 percent of diseased individuals broke at nodes because of especially heavy infections.

Puccinia sorghi Schw. This widespread maize rust was the only species of that genus found. The majority of the plants were attacked, and in some instances the raised pustules on the leaves were very numerous. In general it caused little serious damage. It was most severe on strains of the host from seed recently imported from the United States of America.

Rhizopus sp. One of the regular contaminants of seed grain was a

Rhizopus. It was more frequent in seed stored for a few months than in newly harvested material. It has not been determined how much this fungus is a deterrent to maize germination under local conditions. Its abundance suggests it should be included in the list of those that need to be controlled if seeds are to be kept viable for a reasonable period of time. It has also been recovered from carefully handled moist chamber cultures, where it did not come in as a laboratory contaminant. Here it occurred apparently as a secondary invader following old leaf infections of Helminthosporium and Cercospora.

Stemphylium sp. Literature I have seen does not include this fungus genus as occurring on maize. Spores of it were found, however, on small dark colored lesions that tended to coalesce on the older leaves. The spores were similar to S. botryosum Wallr. and came from leaves of recently imported maize varieties.

Ustilago maydis (DC.) Cda. A few smut-infected plants were found. No diseased ears were seen, and the pustules observed on stalks and leaves were relatively small in size.

Xanthomonas vasculorum (Cobb) Dowson. This bacterial blight organism, common in sugar cane, was isolated by Miss Hastings from the primordia of young diseased seedlings of a sweet corn variety of maize. After studying the cultures, in comparison with the Stewart's wilt organism, young greenhouse seedlings of maize growing in sand were inoculated. Infection and wilt resulted.

Root rot (undetermined). A root rot, or lodging, of maize is said to be in all parts of Costa Rica and it is serious at the Institute. Preliminary isolations from old lodged plants from the Institute plots have resulted in several undetermined fungi. A number of isolations from lodged seedlings have as yet given uncertain results.

Counts made at first by Sr. Gutierrez showed that 28 percent of his plants were lodged. In subsequent visits to 5 other plots I found 16, 16, 31, 56, and 70 percent of the plants lodged. From 19 to 33 percent of the lodged plants died without maturing ears. One special observation deserves mention. A plot of a single strain of maize showed a roughly circular area in which more than half the plants were lodged. At a little distance from this area all plants were unaffected. This indicated a soil-borne trouble, spreading from localized areas.

A study of the plants in areas where lodging was bad showed marked differences in degree of lodging. This suggests that the trouble may be controlled by selecting strains of maize that are resistant or highly tolerant to the trouble.

Virus symptoms. Symptoms of virus disease have also been seen on a sweet corn variety of maize at the Institute. One caused serious

stunting in a few scattered plants. In some of these the tips of the seedling plants seemed to have been killed and this caused multiple stalks to develop. These were barren and short, with yellowed and mottled leaves, and in some cases necrotic spots could befound on the leaf surfaces. Another virus symptom occurred at the edge of another plot of sweet corn. A few plants were seen with typical mottling, characteristic of mild virus infection. These showed almost complete recovery as the plants approached maturity.

Nutrient deficiency. Effects of nutrient deficiency have also been observed, but these were not serious. Symptoms of lack of nitrogen were found, in which leaves exhibited the typical yellow tips and a stripe up the center of the leaf. Some appearance of potash deficiency could also be found in certain localized areas, where plant leaves were marked with typical yellowish white streaks accompanied by dry edges and tips. At first these dried areas suggested possible fungus attack, but moist chamber cultures and tissue tests indicated lack of potassium as the cause.

COMPLEMENTARY CROPS DIVISION, TECHNICAL COLLABORATION BRANCH, OFFICE OF FOREIGN AGRICULTURAL RELATIONS, INTER-AMERICAN INSTITUTE OF AGRICULTURAL SCIENCES, TURRIALBA, COSTA RICA

RECORD AND DIAGNOSIS OF SUBCLOVER SEVERELY INJURED BY YELLOW BEAN MOSAIC VIRUS[1]

Frank P. McWhorter and John R. Hardison

Seeds of the Tallarook variety of subclover, Trifolium subterraneum L., procured from the original paddock in Australia where this horticultural variety was first discovered, were brought into Oregon by plane in 1947. These seeds were planted in the fall of 1947 near Oregon City at the Red Soils Experimental Area, a branch station of the Oregon Experiment Station. Seeds harvested from this first planting were used, September 1948, to plant a seed-increase plot at that station. This seed-increase plot was ruined by a virus disease and subsequently had to be plowed under. Since a seed-borne virus of subclover has been reported in New Zealand (1), it was desirable to determine whether this disease was ascribable to an insect-borne local virus or to an Australasian virus introduced in the seeds.

Infected plants showed three groups of symptoms characteristic of virus injury. These were:

1. Plants that exhibited a prominent yellow mottle as the only symptom. The leaves of these plants were not distorted and the plants were not noticeably reduced in size.

2. Plants that appeared yellow-mottled, and noticeably dwarfed. Individual leaflets were puckered. In addition to a yellow mottling there were numerous hyaline yellow flecks on the leaflets due to the complete loss of chlorophyll at the extremities of major and minor veins.

3. Similar to 2, but with more pronounced savoying and curling of the leaflets. These plants were severely dwarfed.

These three symptoms groups are shown in the accompanying illustration made by sinking the leaves in water containing a wetting agent, thus permitting a rendering of the mottle patterns which are obscured by pubescence of the foliage.

Since the clover plants were in rows, an accurate count of the diseased plants and the distribution of symptoms could readily be made.

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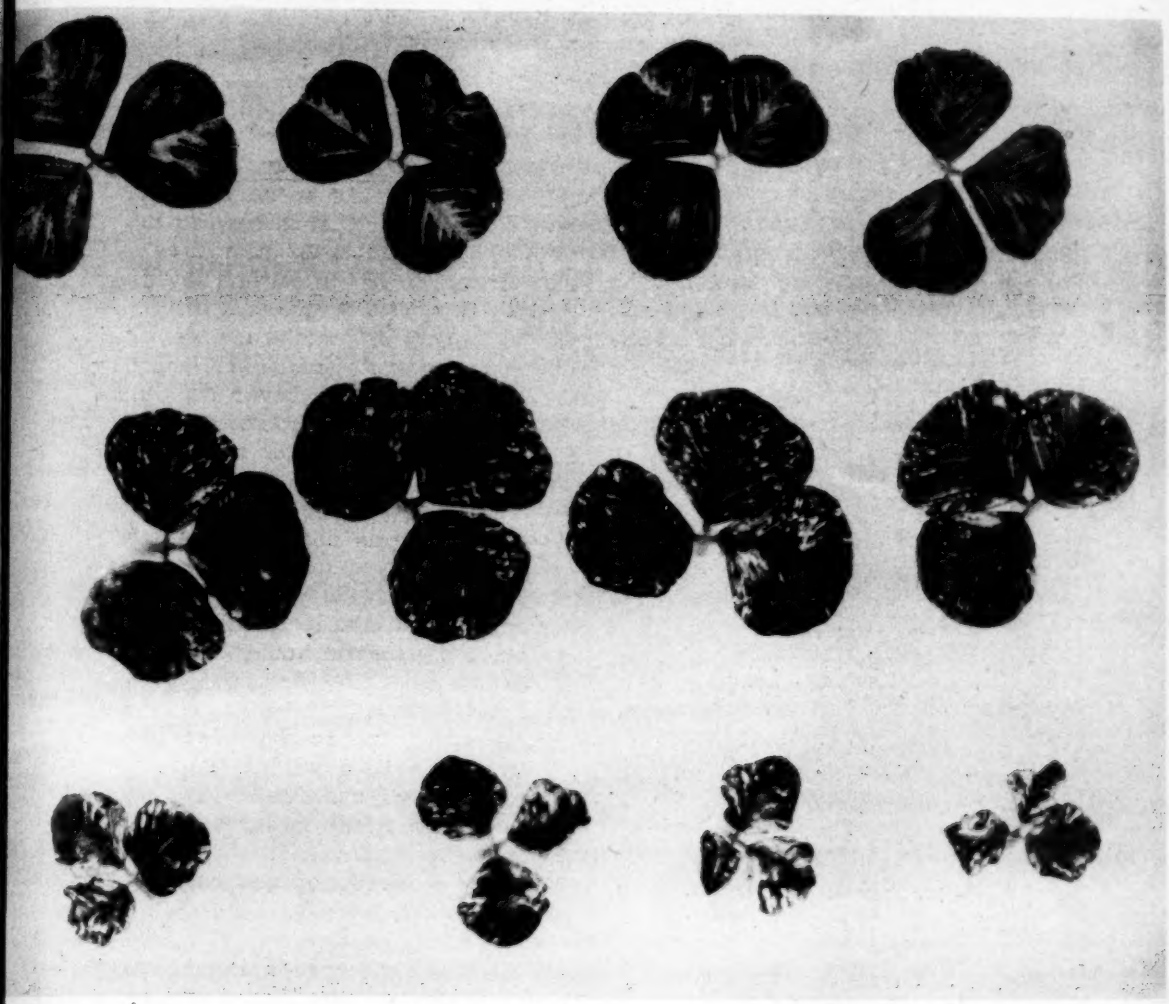

Figure 1. Symptoms of Yellow Bean Mosaic infection of Subclover Trifolium subterraneum L. as observed near Oregon City, Oregon. The leaves are arranged in rows representing the three groups of symptoms on the clover.

Numerous intergrading forms of groups 2 and 3, involving degrees of puckering and dwarfing, necessitated combining these in the following field-record of infection.

No symptoms	21%
Group 1, mottle	48%
Groups 2, 3, yellowing, puckering, dwarfing	31%

Juice from plants representing each symptom group was inoculated into Vicia faba L. test plants. The transfers effected were: Symptom group 1, 10/10; group 2, 9/10; group 3, 7/8. All the infected Vicia faba inoculates developed symptoms characteristic of yellow bean mosaic. The symptoms in the three groups of inoculates showed no significant macroscopic differences which would interpret the varying symptoms in the three groups of clover source plants. The symptoms of all the inoculates began as initial vein clearing followed by prominent yellow mottle. Microscopically, the test plants from group 1 showed a more abundant development of cytological evidence than did the others. However, all plants examined showed characteristic cytological indications of bean virus 2 (3).

In the course of studies of yellow bean mosaic in Oregon, McWhorter had previously inoculated subclover with a type strain of the virus that mottles Blue Lake beans, and with an isolate from gladiolus. The type strain produced symptoms in the clover like those of symptom group 1. The gladiolus strain produced more severe symptoms but not so severe as those in groups 2 and 3 above.

As a further check on this determination, leaves from subclover plants of each symptom group were examined for cytological evidence. Each had crystalline inclusions and viroplast formation characteristic of yellow bean mosaic (3). Group 1 had more than the others. Crimson clover shows very similar cytological evidence when infected with yellow bean mosaic virus. In both these clovers the virus can be positively identified in a few minutes by the Trypan Blue test (2). The test is not readily applicable to red clover which is the common host of the virus.

A neighboring planting of red clover, Trifolium pratense L., was the likely source of the yellow bean mosaic in the subclover. Observations on the occurrence of this disease in annual legume crops in the Willamette Valley have shown that red clover is the usual source of the virus. Red clover regularly harbors both this virus and its vectors.

It is concluded that this infection of subclover at Oregon City was not introduced on the seed and that the disease was due to local strains of bean virus 2.

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OREGON AGRICULTURAL EXPERIMENT STATION AND U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

REPORTS OF ALFALFA DISEASES IN NORTH CAROLINA

S. G. Lehman

Alfalfa diseases were prevalent and more severe than usual in many North Carolina fields during the last two months of 1948. Common leaf spots, yellow leaf blotch, and black stem could be found in many fields in early November. The severity of these diseases increased during November to such an extent that by early December defoliation and death of stems was a conspicuous feature of many fields.

Two out of five alfalfa fields visited in the vicinity of Raleigh (Wake County) were heavily infested with a stem blight disease and with common leaf spot. The plants were 6 to 10 inches tall and approximately 50 percent of the stems were yellow and dying. Dying of the new stems appeared to be caused by growth of a fungus downward from the blackened cut ends of old stems so as to encircle the base of the new stems. Ascochyta sp. was fruiting profusely on many of the dead leaves on these dying stems but not on the stems themselves although some of them had blackened areas resembling black stem. On the remaining live plants, all leaves below the middle were turning yellow and shedding because of numerous infections by the common leaf spot fungus (Pseudopeziza medicaginis). Most of these infections were young but a small proportion of them bore open apothecia.

Yellow leaf blotch (Pyrenopeziza medicaginis) was causing considerable damage in two fields observed. Many of the leaves were rolled up and blackened by development of mycelium in the tissues. Apothecia in all stages of development were present on the blackened areas. One field had been cut about 15 days before this inspection to avoid loss of foliage. On about 10 percent of the plants all leaves remaining on the stubble were dying from yellow leaf blotch.

Alfalfa plants received from Harnett County on December 3 were heavily speckled with disease lesions most of which were small and obviously quite young. Isolations yielded Stemphylium botryosum from most of the lesions. The lesions were so numerous as to cause considerable anxiety to the grower, who has more than 200 acres in alfalfa.

Diseased alfalfa plants received from Johnston County on December 10 bore many uredia of the rust, Uromyces striatus var. medicaginis, on the leaves. When this field was inspected one week later, most of the leaves had already died, apparently from the effect of the heavy rust infection.

On December 20, downy mildew (Peronospora trifoliorum) was found on a sample of diseased alfalfa received from Jones County. Lesions were present on many of the leaves and typical conidiophores were abundant. The

same disease was recognized in late November by Mr. Clarence Hanson in a field of alfalfa near Raleigh.

The stem rot disease (Sclerotinia trifoliorum) was found on young alfalfa plants received from Iredell County in the last week of December. Young sclerotia were present partially embedded in the diseased stems. This field of 35 acres was sowed to alfalfa in late summer of 1948. The grower estimated about 25 percent of the plants were diseased on a 17-acre block in this field where a clover sod had been plowed down and oats and lespedeza sowed in the fall of 1947. Also he reported that no stem rot was present on the remaining 12 acres where oats and lespedeza had been sowed in the fall of 1946 and again in the fall of 1947.

An unusual number of rainy days occurred in November, more than twice the normal amount of rain having fallen. Likewise the early part of December was rainy and rather warm. These conditions apparently account in part for the unusual severity of alfalfa diseases in North Carolina in recent months.

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION, RALEIGH, NORTH CAROLINA

ALFALFA AND SOYBEAN DISEASES IN VIRGINIA, 1948

S. B. Fenne

There was an unusual amount of forage crop diseases present in the State during the past year. This can be largely accounted for because of the continuous wet weather in many parts of the State. Black stem, Ascochyta imperfecta, of alfalfa was unusually prevalent. The disease started in late February and in some parts of the State continued throughout the whole summer. Black stem is not a new disease in Virginia. It is generally present in alfalfa fields in the State, but usually only a few of the lower leaves are lost. This year, however, severe injury occurred in fields. In many cases, the first cutting was practically ruined. Plants in spots of certain fields were killed. This killing was probably due to a combination of factors, including black stem, winter injury, and in some cases, improper fertilization.

Stem rot, Sclerotinia trifoliorum, which has been the most serious disease of alfalfa in Eastern Virginia for several years was present in many fields. The damage, however, from stem rot was less severe than in past years. Downy mildew, Peronospora trifoliorum, was present in many alfalfa fields in early spring and late fall, but the damage appeared to be negligible. A new disease in Virginia, caused by the stem nematode, Ditylenchus sp., was found on one farm in Henrico County. It is not yet

known to what extent this disease is spread throughout the State, nor is it known how serious it might prove to be under Virginia conditions.

Alfalfa leaf spots caused by Pseudopeziza jonesii, Pyrenopeziza medicaginis, Stemphylium botryosum and Colletotrichum trifolii were frequently observed. Fusarium wilt, Fusarium oxysporum f. medicaginis, was found in several fields.

Following the increase in acreage devoted to soybeans in the State, several new diseases have become prevalent. Pod and stem blight, Diaporthe sojae, and frog-eye leaf spot, Cercospora daizu [C. sojina] are frequently observed. Sclerotial blight, Sclerotium rolfsii, is rather common in the Eastern Virginia light sandy soils.

In an effort to determine the practical value of soybean seed treatment, several demonstrations were set up wherein soybean seed were treated with Arasan. Results of this seed treatment were spectacular in some cases. In one demonstration, treatment of low-vitality seed increased the stand 103 percent. In other cases, where seed of high quality and high germination were treated, very little increase in stand resulted.

VIRGINIA POLYTECHNIC INSTITUTE, BLACKSBURG

GRAY MOLD OF BEANS IN WESTERN WASHINGTON

Leo Campbell

Serious losses to fruits and vegetables in western Washington can be expected from gray mold, Botrytis cinerea, if rains are prevalent immediately preceding and during harvest, but losses from the disease have been comparatively unimportant when fair weather prevailed during this period. The presence of the pathogen as a saprophyte on organic matter in the soil, and the more constantly high humidity near the soil surface, afford a most favorable environment for primary infection by the gray mold fungus. Consequently, the disease ordinarily is most common and destructive on such low-growing crops as strawberries, dwarf peas, and bush beans, but relatively unimportant on taller crops of comparable susceptibility such as raspberries, tall peas, and pole beans.

Although gray mold has been sufficiently destructive on bush beans to discourage commercial production of this crop, until 1948 it was not considered a serious factor in growing pole beans in western Washington. This season, however, when rains were unusually frequent during the growing period, losses from the disease in pole beans amounted to as

high as 50 percent in many fields. Because of the increased importance of the Blue Lake variety of pole beans during the past several years, and the serious damage to the 1948 crop from gray mold, the disease on this crop has become of special interest.

Other factors being comparable, gray mold in Blue Lake beans was most destructive where the rows were closest together, where the stand of plants and the growth of foliage were greatest, where the rows ran at right angles to the direction of the prevailing winds, and where the air movement through the plantings was obstructed. Such conditions increase the atmospheric humidity among the plants, making conditions more favorable for infection by the gray mold fungus. Infection was distinctly more prevalent where beans were drilled in rows four feet apart and left unthinned, than where the rows were six feet apart and the plants were thinned to approximately four inches, or where planted in hills 16 to 18 inches apart. The heaviest infection noted occurred in a field where the foliage was dense and the rows were close together and at right angles to the direction of the prevailing winds and where the field was closely adjoined at one end by another bean field with rows running in the opposite direction.

Under the subsequently described condition for infection all of the aboveground parts of the plants were found to be susceptible to gray mold. In all such cases noted, infection occurred where the parts of the plant were in direct contact with each other (Plate 1, Fig. C), but in the majority of cases, infection occurred where the old blossom had fallen on the plant (Plate 1, Fig. B) or had been retained at the tip of the pod (Plate 1, Fig. A). With comparatively few exceptions, pod infection was associated with the latter condition. This would indicate that the Blue Lake bean is normally resistant to infection by Botrytis and is infected only after the pathogen has made initial growth on living parts previously blemished by contact with other parts or on non-living matter in contact with living parts, or only when sufficient moisture for infection is retained by the parts in contact.

The heavy losses experienced from gray mold in 1948 are accredited to the unusual amount of rain during the growing season (Plate 2). During summers of average rainfall in western Washington, losses sufficiently heavy to warrant control measures for the disease on Blue Lake beans would not be expected. Even under reasonably favorable conditions for the development of gray mold, it is believed that an economical control of the disease could be attained by spacing the rows at least five feet apart and by planting in hills, or thinning the plants in drilled rows to approximately four inches apart. Rotation of crops in such a way as to reduce the medium for saprophytic development of the pathogen in the soil, thus reducing the source of primary infection, should aid materially in reducing gray mold damage. Sweet corn, which is a popular crop in the areas where the Blue Lake bean is grown, is highly recommended for this purpose. Prevention of excessive foliage by proper soil fertilization or other means, without reducing yields or the quality of the crop,

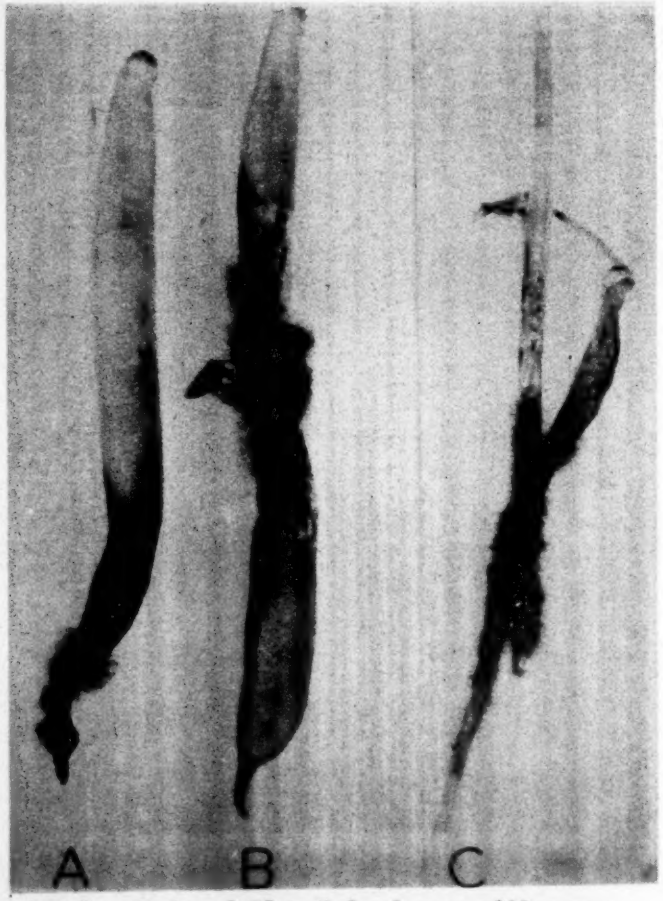

PLATE 1. Pods of Blue Lake beans with gray mold resulting from three different types of infection: A — infection from old blossom retained at tip of pod; B — infection from old blossom lodged on side of pod; and C — infection at point of contact of pod and stem.

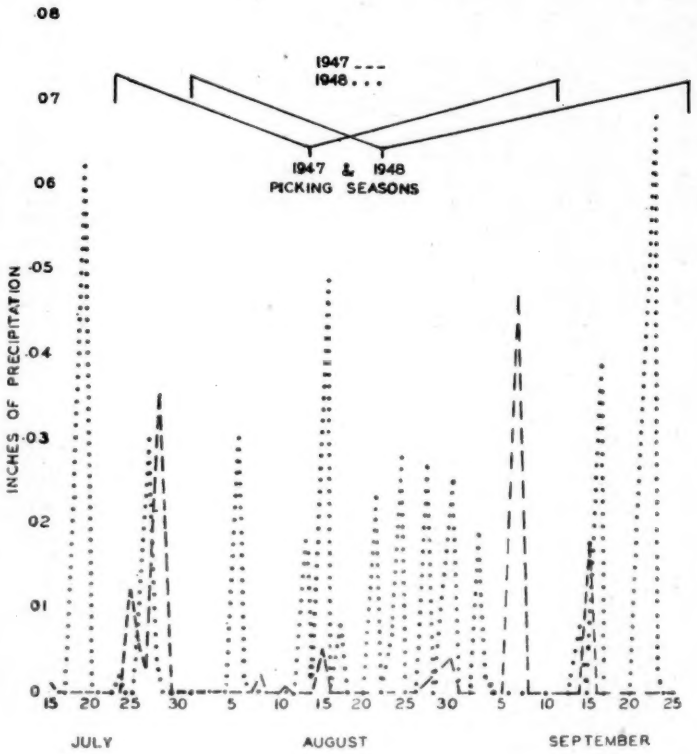

PLATE 2. Comparison of amount and distribution of precipitation during the bean picking seasons of 1947 and 1948.

should permit better aeration among the plants and thus reduce the amount of mold.

Large-scale applications of sulfur dust failed to control gray mold after it was well established in the fields; and in small-scale tests under field conditions and in the laboratory, neither Fermate, Zerlate, Parzate, Phygon, sulfur nor copper-lime, applied as dusts, showed any promise as a control of the disease.

White mold, Sclerotinia sclerotiorum, which was often mistaken for gray mold by the growers, was found in certain areas of most of the bean fields examined and caused serious damage in some. In all cases examined, the pathogen progressed upward from the base of the stem, often to as high as two to three feet from the soil. The losses from white mold were due to the direct killing of the plants and not to isolated pod infection as was the case with gray mold. There was no indication of infection by ascospores of the white mold pathogen.

STATE COLLEGE OF WASHINGTON, INSTITUTE OF AGRICULTURAL SCIENCES, AGRICULTURAL EXPERIMENT STATIONS, WESTERN WASHINGTON EXPERIMENT STATION, PUYALLUP, WASHINGTON

CORRAL SPOT EFFECT ON BEANS IN CALIFORNIA

R. S. Baskett[1] and C. Emlen Scott[2]

Zinc deficiency has been widely recognized in California since about 1931 in deciduous fruit and nut trees, citrus, grape vines and ornamental trees and shrubs. This disorder has been suspected a few times in annual plants in the San Joaquin Valley but there seems to be no recorded case of response to zinc applications in any annual in California. Soils in which fruit and nut trees will become worthless if not supplied with zinc are usually excellent for a wide variety of annual crop plants, including those known to develop deficiency symptoms elsewhere.

Zinc deficiency symptoms are frequently markedly accentuated in old corral sites within little leaf areas. In other areas this deficiency is often found only on corral sites or Indian camps. Trees in such areas have shown striking response to zinc but in some instances copper is also lacking.

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The writers were therefore interested in observing a corral spot in a 110-acre field planted to Red Kidney beans near Linden, San Joaquin County. The owner called our attention to a chlorotic area of an acre or two near the center of the field. Two sides of the area were sharply defined, suggesting old fence lines, while the balance of the margin was somewhat irregular. When first examined on August 12, 1948, the affected plants were stunted, the foliage showed interveinal chlorosis, and very few pods had set. The immature leaflets were abnormally narrow, and were crinkled or ruffled. These symptoms agree with the description of zinc deficiency of beans in Florida.

Zinc sulfate plus hydrated lime was applied as a foliage spray to a 1/50-acre plot on August 17. The dosage was at the rate of 2 lbs. zinc sulfate and 1 lb. hydrated lime in 50 gallons to cover one acre, or actually 18.25 grams of zinc sulfate to the plot.

Immature leaves which were tagged in the spray plot on August 17 were normal on August 24. Similar tagged leaves in the unsprayed area showed definite symptoms on this date. On September 9 all but a very few of the new leaves in the spray plot were normal and some of the older leaves had recovered their normal color. Blossoming was in progress and new pods were setting. By that time the unsprayed plants in the corral area were stunted and had set very few pods. On August 12 the corral area was conspicuous because of the chlorotic foliage in contrast to the dark green of the normal plants. By September 9 this appearance was reversed as the normal plants were yellowing from maturity and the corral area was comparatively darker in color because of delay in maturity.

This bean field adjoins an orchard district (walnut, peach, cherry, pear) where little leaf is not known to be a problem. Corral spots may exist in this orchard area but none have come to our attention. The owner, Mr. Perry Cox, has supplied the land history as follows:

1850 - barn and corrals constructed.
1900 - barn and corrals removed.
1900 - 1940 - cropped to hay, grain, pasture.
1940 - land levelled for irrigation.
1941 - 42 - 43 - beans.
1944 - 45 - tomatoes
1946 - grain.
1947 - 48 - beans.

Mr. Cox had noted that barley lodged badly in the corral area and in some years was crowded out by excessive weed growth. The owner had not noted any abnormality in the previous crops of beans.

AGRICULTURAL EXTENSION SERVICE, STOCKTON AND BERKELEY, CALIFORNIA

CORKY RINGSPOT FOUND IN POTATOES FROM INDIANA

Harold T. Cook

Corky ringspot, which was observed in Florida for the first time in April 1946[1], was found in a lot of 300 bags of round white potatoes (variety unknown) shipped from Indianapolis, Indiana, to Columbus, Georgia, in November 1948. It is understood that these potatoes were grown in the vicinity of North Judson, Indiana.

According to the inspection certificate 30 percent of the potatoes were affected with internal browning or discoloration. All of the specimens submitted to this office by the Inspection Service showed circular or arc-shaped cracks or brownish areas on the surface and rusty brown blotches and streaks radiating from these into the flesh.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, BELTSVILLE, MARYLAND

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[1] Eddins, A. H., E. Q. Procter, and Erdman West. Occurrence of Corky Ringspot of Potatoes in Florida. Plant Disease Reporter 30: 232-233. 1946.

THE OCCURRENCE OF MONILINIA LAXA IN MICHIGAN

Donald Cation, John C. Dunegan, and Joyce Kephart

While making observations in 1948 on the development of blossom blight, due to Monilinia fructicola, the senior author encountered atypical symptoms in three Michigan cherry orchards. The affected trees were in orchards near the shore of Lake Michigan, west of the towns of Shelby, Hart, and at Bower's Harbor near Traverse City. In each orchard the atypical symptoms were found only on a few trees in the lowest part of the orchard where air movement apparently was restricted by the surrounding forest. These symptoms involved the killing of the spurs and twigs and the production of sporodochia on the blossoms and woody tissues.

Cultures isolated at Plant Industry Station, Beltsville, Maryland, from this Michigan material produced appressed mycelia which failed to sporulate profusely on potato dextrose agar. The fungus grew slowly, producing lobed colonies distinct in appearance from those of Monilinia fructicola. These colonies had the same growth characteristics as Monilinia laxa cultures from apricots grown in Oregon and the Michigan fungus was referred to M. laxa. These isolations from cherry apparently constitute the first report of this fungus from Michigan.

It is realized that, strictly speaking, the name Monilinia laxa is being used incorrectly, since the apothecial stage of this fungus apparently has not been reported in North America. Calavan and Keitt[1] in a recent paper have commented upon the uncertain state of our knowledge concerning the species M. laxa and the need for further work on the problem. It may well be, as they suggest, that what is called M. laxa in North America really is not the true species as described in Europe. Pending further clarification of this problem, the present authors are using the name M. laxa to denote isolations encountered by them that have many of the characteristics of the species as described in Europe.

MICHIGAN AGRICULTURAL EXPERIMENT STATION AND DIVISION OF FRUIT AND VEGETABLES CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, BELTSVILLE, MARYLAND.

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[1] Calavan, E. C., and Keitt, G. W. Blossom and sour blight Sclerotinia laxa of sour cherry. Phytopath. 38: 857-882. 1948.

THE OVERWINTERING OF MONILINIA FRUCTICOLA IN TWIG CANKERS UNDER MICHIGAN CONDITIONS

Donald Cation and John C. Dunegan

Climatic conditions during the spring of 1947 were very favorable to development of blossom blight in peach orchards around Benton Harbor, Michigan.

Numerous cankers developed on the twigs following the infection of the blossoms by Monilinia fructicola and in the fall of 1947 many of the growers were concerned over the possible effect of these cankers upon the succeeding peach crop. Roberts and Dunegan[1] had studied this problem of the overwintering of cankers a number of years ago in Georgia, but it was realized that the results obtained in Georgia might not necessarily be applicable to Michigan conditions.

In Georgia the cankers have to survive a long hot summer, whereas, in Michigan the cankers are rarely subjected to prolonged periods of high temperature such as normally occur in Georgia. In addition, the longer growing season in the South favors the closing of the canker by callus tissue, a phenomenon which tends to seal off the diseased tissue and bury it so that spore production is very uncommon the following spring.

With twig cankers abundant in Michigan in 1947, it was decided to determine whether or not the fungus was alive in the twigs the following year. Cankers were collected from various orchards during the months of January, February, and March and fragments from the inner tissues placed on cooled, solid potato dextrose agar in petri dishes.

The results (Table 1) show that the fungus was alive in a considerable numbers of these cankers.

However, the fact that the fungus was alive in an average of 73 percent of the cankers still does not prove that they are a serious menace to the new crop. The fungus must remain alive and produce spore pustules during the blooming period or later to constitute a threat to the new crop.

An extensive survey of orchards on May 4-5, 1948 failed to show any cankers with spore pustules on them. The temperatures were below the optimum for the fungus during the time of this survey and this may explain the absence of spore production, for specimens had been submitted earlier to Cation which showed spore production. Cankers collected on May 5, 1948 subsequently sporulated profusely when placed in moist cham-

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1 Roberts, J. W., and J. C. Dunegan. Peach Brown Rot, U. S. Dept. Agr. Tech. Bul. 328. 1932.

Table 1. Results of attempts to isolate Monilinia fructicola from overwintered peach twig cankers

Date	Location	Variety	Total Number	Results: Positive	Results: Negative	Percent with brown rot fungus alive
1/14/48	Sodus, Mich.	Rochester	12	10	2	83.3
1/14/48	Sodus, Mich.	Gold. Elb.	12	11	1	91.6
1/14/48	South Haven	Wilma	26	16	10	61.5
2/18/48	Sodus, Mich.	Gold. Elb.	50	45	5	90.0
2/19/48	South Haven	Not known	25	21	4	87.5
3/24/48	Sodus, Mich.	Gold. Jubilee	64	35	29	54.6
		Total	189	138	51	73.0

bers at room temperatue (approximately 70° F.) at Plant Industry Station, Beltsville, Maryland.

The results of this one season's experiments have shown that the fungus does overwinter under Michigan conditions. Spore production can be induced from these overwintered cankers, but the authors as yet have not observed such profuse spore production, under natural conditions, that the overwintered cankers constitute a threat to the safety of succeeding crops. These studies are being continued.

MICHIGAN AGRICULTURAL EXPERIMENT STATION AND DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE, BELTSVILLE, MARYLAND

VERTICILLIUM WILT ON APRICOTS IN WASHINGTON STATE

Austin C. Goheen

During the summer of 1948 Dr. Earle C. Blodgett of Prosser collected a specimen of a wilt and dieback disease of apricots (Prunus armeniaca L.) from the vicinity of Yakima, Washington. This specimen was forwarded to the Plant Pathology Department of the State College of Washington at Pullman for diagnosis. Culture work at Pullman showed the disease to be associated with Verticillium alboatrum Rke. & Berth.

The specimen did not show extensive discoloration of the vascular tissues as is characteristic of Verticillium wilt on apricots. The twigs from the main limb of the specimen were dead. At the base of each dead twig there was an extensive gum exudate. Mummied fruits were still attached to the limb. No organism could be isolated from the gum. Verticillium alboatrum was isolated from the mummies, the dead twigs, and the wood of the main limb of the specimen.

This apparently is the first report of this organism on apricots in Washington State. Verticillium wilt has been reported from this State previously on maple, potato, tomato, chrysanthemum, cineraria, eggplant, horseradish, larkspur, and raspberry. Verticillium on apricots has been reported previously from California and Utah; and in 1944 it was reported for the first time from the Okanogan Valley of British Columbia, which is immediately adjacent to Washington State on the north.

STATE COLLEGE OF WASHINGTON, PULLMAN

APPLE DISEASES IN PENNSYLVANIA IN 1948 AND DURING THE TWENTY-YEAR PERIOD ENDING IN 1948

R. S. Kirby

Incidence of apple diseases in 1948 is summarized in Table 1 (page 100-101). Averages for the 20-year period 1929-1948, inclusive, are given in Table 2 (page 102-103).

1948 was especially interesting in that we had nearly one-and-a-half times normal precipitation in April, May, and June, about normal precipitation in July and August, and less than one-half normal in September.

Scab was the most severe that it had been during any of the 20 years that we have taken records. Other diseases, such as sooty blotch and Brooks spot, which come late in the summer, were below average.

PENNSYLVANIA STAGE COLLEGE, STATE COLLEGE

Table 1. Apple diseases in Pennsylvania in 1948. State summary compiled from observations by R. S. Kirby, A. H. Bauer, O. D. Burke, E. E. Honey, and L. Nichols. (Table concluded on next page).

Spraying record	Number orchards surveyed	Number apples counted	Diseased fruit: Scab* Number	Scab* Percent	Brooks spot Number	Brooks spot Percent	Sooty blotch Number	Sooty blotch Percent
Complete -- all sprays as recommended	129	39,525	1244	3.1	78	0.2	2	T
Incomplete -- sprays omitted, time, material, method, poor	158	40,145	11127	27.7	523	1.3	204	0.5
Unsprayed	20	700	687	98.3	101	14.4	113	16.1
Total	307	80,370						
Incomplete								
Method poor	31	6,400	1563	24.2	108	1.6		
Time wrong	4	900	44	22.7	27	0.3		
Substitute materials	2	1,100	20	9.3				
All sprays applied except --								
Delayed dormant	13	3,200	692	21.6	35	1.1	3	0.1
Pre-pink	11	3,550	854	24.0	8	0.2		
Pink	8	2,500	601	24.1	2	0.1	3	0.1
Petal-fall	1	200	121	60.5	1	0.5		
First cover	1	200	124	62.0	22	11.0	4	2.0
Second cover	1	200	50	25.0				
Fourth cover	9	2,900	411	14.2	46	1.5		
Fifth cover	5	1,000	191	19.1	11	1.1		
Total with any one spray omitted	52	14,050	3125	22.3	125	0.9	10	T
Two sprays " "	37	9,225	2460	26.6	122	1.3	10	0.1
Three " "	15	4,450	1384	31.1	70	1.5	75	1.6
Four " "	11	2,400	1322	55.2	46	1.9	1	T
Five " "	4	550	455	82.8	21	3.8	56	10.2
Six " "	3	220	217	98.6	2	0.1	37	16.8
Seven " "	2	300	183	61.0			14	4.7
Total, sprays omitted	105	26,995	7699	28.4	351	1.3	191	0.7

*Scab [*Venturia inaequalis*], Brooks' spot [*Mycosphaerella pomi*], Sooty blotch [*Gloeodes pomigena*]

Table 1 concluded

Spraying record	Diseased fruit															
	Blotch*		Black rot		Fitter rot		Blue mold		Apple rust		Quince rust		Brown rot		Black pox		Total	
	No.	%	No.	%	%		%		%		%		%		%		No.	%
Complete -- all sprays as recommended			16	T	T				T						T		1359	3.4
Incomplete -- sprays omitted, time, materials, method, poor	1	T	70	0.2	T		T		0.1		T		T				11967	29.8
Unsprayed	1	0.1	52	7.4											1.1		952	100.0
Incomplete																		
Method poor			3	T					0.7								1679	26.1
Time wrong																	229	25.7
Substitute materials			1	0.1													103	9.4
All sprays applied except --																		
Delayed dormant													.2				737	23.0
Pre-pink			5	0.1			T		0.1				T				871	24.5
Pink			3	0.1					0.1		0.1						612	24.5
Petal-fall																	122	61.0
First cover																	150	75.0
Second cover																	50	25.0
Fourth cover			5	0.2					T								464	16.0
Fifth cover											0.1						202	20.3
Total -- any one spray omitted			13	0.1			T		T		T		.1				3290	24.4
Two sprays "			22	0.2					0.1		0.1						2627	28.8
Three " "			1	0.1					0.1								1534	34.5
Four " "			14	0.6	0.2				0.4								1390	58.0
Five " "			9	1.6													541	98.6
Six " "			6	2.7													262	100.0
Seven " "	1	0.3															198	66.0
Total, sprays omitted	1	T	50	0.2					0.1		T		T				8326	30.8

*Blotch [Phyllosticta solitaria], Black rot [Physalospora obtusa], Bitter rot [Glomerella cingulata], Blue mold [Penicillium], Apple rust [Gymnosporangium juniperi-virginianae], Quince rust [G. clavipes], Brown rot [Sclerotinia fructicola], Black pox [Helminthosporium papulosum].

Table 2. Apple diseases in Pennsylvania, 1929-1948. State summary compiled from observations of R. S. Kirby and other plant pathology extension workers during the past 20 years. (Table concluded on next page)

Spraying record	Number orchards surveyed	Number apples counted	Diseased fruit: Scab* Number	Scab* Percent	Brooks spot Number	Brooks spot Percent	Sooty blotch Number	Sooty blotch Percent
Complete -- all sprays as recommended	2,482	1,104,474	17851	1.6	3158	0.3	1526	0.1
Incomplete -- sprays omitted, time, materials, method, poor	3,883	1,320,520	187060	14.1	17037	1.3	42778	3.2
Unsprayed	756	75,122	56405	75.1	6072	8.1	25221	33.6
Total	6,121	2,500,116						
Incomplete								
Method poor	329	77,665	20888	26.6	1390	1.8	2683	3.4
Time wrong	165	41,654	8604	20.7	625	1.5	982	2.4
Substitute materials	355	121,204	8498	7.0	665	0.5	874	1.5
All sprays applied except --								
Delayed dormant	363	123,931	10373	8.4	377	0.3	711	0.6
Pre-pink	310	100,976	8008	7.9	560	0.5	1345	1.3
Pink	172	51,356	6765	13.2	368	0.7	527	1.0
Petal-fall	71	16,870	1710	11.2	215	1.3	216	1.3
First cover	74	17,911	1823	10.2	357	2.0	292	0.2
Second cover	123	36,677	2180	5.9	497	1.4	569	1.6
Third cover	52	17,675	1274	7.2	545	3.1	1318	7.4
Fourth cover	411	153,383	8077	5.3	1321	0.9	5492	3.6
Fifth cover	10	1,700	244	1.4	18	0.1	163	9.6
Total -- any one spray omitted	1469	569,338	46437	8.1	4742	0.8	12116	2.1
Two sprays "	833	259,726	37564	14.5	3220	1.2	7510	2.9
Three " "	417	110,435	23469	21.2	1104	1.0	7411	6.7
Four " "	247	53,072	17062	31.7	1559	2.9	6513	12.1
Five " "	138	25,525	11148	43.7	1214	4.8	4730	18.5
Six " "	56	7,383	4714	59.8	523	6.6	2058	26.1
Seven " "	7	1,150	716	62.3	22	1.9	117	10.2
Total, sprays omitted	3189	1,024,574	140160	15.9		1.3		4.1

*See Table 1

Table 2 concluded.

Spraying record	Diseased fruit: Blotch*		Black rot		Bitter rot	Blue mold	Apple rust	Quince rust	Brown rot	Black pox	Total	
	No.	%	No.	%	%	%	%	%	%	%	No.	%
Complete -- all sprays as recommended	170	T	421	T	T		0.9	T		T	24737	2.2
Incomplete -- sprays omitted, time, materials, method, poor	844	0.1	1948	0.2	0.1	T	0.1	T	T	0.1	257595	19.4
Unsprayed	1723	2.3	2040	2.7	0.2		T	T		0.5	92194	122.7
Incomplete												
Method poor	38	T	124	0.2	T		0.1	T		0.1	23695	30.5
Time wrong	1	T	23	0.5	0.2		1.0	0.1		0.3	11808	27.4
Substitute materials	6	T	63	T								
All sprays applied except --												
Delayed dormant	19	T	117	0.1	0.3		0.1	T	T	T		9.8
Pre-pink	52	T	77	0.1	0.2		0.1	T	T	0.3		10.6
Pink	50	0.1	37	0.1	T		0.1	T		0.1		15.7
Petal-fall			15	0.1			0.1	T				12.9
First cover	4	T	14	0.1	0.1		0.1	T				13.9
Second cover	4	T	33	0.1	T		0.1	T		T		9.1
Third cover	18	0.1	7	T	0.1		0.1	T		T		17.8
Fourth cover	30	T	67	T	T		T	T		0.1		10.1
Fifth cover			2	0.1				0.1		2.2		27.4
Total -- any one spray omitted	152	T	637	0.1	0.1		0.1	T	T			11.6
Two sprays "	132	0.1	322	0.1	0.1		0.1	T	T	0.1		19.2
Three " "	62	0.1	241	0.2	0.1		0.2	T	T	0.2		29.7
Four " "	208	0.5	226	0.4	0.2		0.1	T		0.9		49.6
Five " "	158	0.6	245	1.0	0.1		T	T	T	0.1		68.4
Six " "	130	1.6	83	1.1	T		0.1			0.8		98.3
Seven " "	1	0.1	19	1.6				0.1				76.1
Total, sprays omitted		0.1		T	0.1		0.1	T	T	0.1		19.9

*See Table 1

CHECK LIST REVISION

Freeman Weiss

TROPAEOLUM (TROPAEOLACEAE)

TROPAEOLUM MAJUS L., GARDEN NASTURTIUM. Tender herb of S. America grown, in a variety of horticultural forms, as an annual in warm seasons or under glass. T. PEREGRINUM L., CANARY-BIRD FLOWER (2), of similar origin and habit is also grown for ornament.

Albugo ? candida (Pers. ex Chev.) O.Kuntze, white rust. N. Y. (1)
? Alternaria sp., leaf spot. N. J., Ohio. See also Pleospora sp.
Botrytis cinerea Pers. ex Fr., gray mold. Alaska (1)
Cercospora tropaeoli Atk., leaf spot. Ala. (1)
Cuscuta sp., dodder. Mo., N. H. (1)
Heterodera marioni (Cornu) Goodey, root knot. N. J., Hawaii (1)
H. schachtii A.Schm., root gall. (1)
Pleospora sp. (? P. herbarum (Pers. ex Fr.) Rabh.), leaf spot. Miss., N. J., Ohio (1). The conidial stage, Stemphylium sp., has also been reported as Alternaria.
Pseudomonas aptata (N.A.Brown & Jamieson) Stapp, leaf spot. Me., Minn., Miss., N. J., Pa., Va. (1)
P. solanacearum E.F.Sm., bacterial wilt. Fla., Md., N. J., N. Car., Va. (1)
Puccinia aristidae Tracy (0,I), rust. Utah (1). II and III on Aristida and Distichlis spp.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta Virus 1 K.M.Sm.). Calif. (1,2), Tex. (1)
Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Calif., Md., Tex. (1)
Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif.

TYPHA (TYPHACEAE)

TYPHA ANGUSTIFOLIA L. (1) and T. LATIFOLIA L. (2), CAT-TAIL. Perennial herbs of marshlands distributed throughout temperate N. America; grown in bog gardens for ornament, the leaves are used in basketry, and the inflorescences and rootstocks furnish food for wildlife.

Cladosporium spp., leaf mold. General. Usually reported as C. typharum Desm., also C. fasciculatum Cda., C. herbarum Lk. ex

TYPHA cont.

Fr., and C. typhae Schw.; perhaps not distinct.
Cryptomela typhae (Pk.) Died., on culms and leaves. N. Y (1,2); Mass. (2). Also reported as Fusella typhae Lindau and Melanconium typhae Pk.
Didymosphaeria typhae Pk., on culms. N. Y. (2).
Gloeosporium sp. Mass. (1).
Guignardia sp. Ga. (2)
Hendersonia typhae Oud. (=Stagonospora typhoidearum?), on leaves. Wis. (1)
Heterosporium maculatum Klotzsch ex Cke. (=H. typharum Cke. & Mass.?), on leaves. Colo., Mo., N. Dak. (2)
Hymenopsis hydrophila Sacc., on leaves. N. Y. (2)
Leptosphaeria spp., on culms and leaves. L. hydrophila Sacc., N. Y. (1); L. luctulosa Niessl, Mo. (2); L. typharum (Desm.) Karst. (L. typhae Karst.), Mo., Mont., N. Y. (2)
Leptothyrium typhina Dearn. & House, on culms. N. Y. (2)
Lophodermium typhinum (Fr.) Lambotte, on leaves. Ga., N. Y. (2)
Mycosphaerella typhae (Lasch) Lindau, on leaves. Ga., Md., N. Y., N. Dak., Pa. (2). Also reported as Phaeosphaerella t. (Lasch) Petr.
Ophiobolus sp. (O. typhae Feltg.?), culm rot. Ark. (2)
Phoma orthosticha Ell. & Ev., on leaves. Me. (2). Probably = P. typharum Sacc. or Phyllosticta t. (Sacc.) Allesch., the conidial stage of Leptosphaeria t.
Phyllosticta typhina Sacc. & Malbr. (P. renouana Sacc. & Roum.), leaf spot. Nebr., N. Y., Ore., Wis. (2).
Pleospora typhae Pass., on leaves. Calif. (2)
Pythiogeton autossytum Drechs., leaf rot. Ohio (2)
Pythium helicoides Drechs., leaf rot. Ohio (2)
Sclerotium hydrophilum Sacc., on culms. Ark. (2)
Scolecotrichum typhae Ell. & Ev., on leaves. Colo. (2)
Stagonospora typhoidearum (Desm.) Sacc., leaf spot. Wis. (2)
Typhula latissima Remsberg, on dead culms. N. Y. (2)

URTICACEAE

BOEHMERIA

BOEHMERIA CYLINDRICA (L.) Sw., FALSE-NETTLE. Perennial herb of eastern N. America, useful to wildlife.

Aecidium boehmeriae Arth. (0,I), rust. Ind., Md., N. Y.
Cercospora boehmeriae Pk., leaf spot. Ala., Nebr., N. Y., N. Car., Pa., Tenn., W. Va., Wis.
Phyllosticta boehmeriicola J.J.Davis, leaf spot. Wis.
Septoria tenuissima Wint., leaf spot. Kans., Mo.
Synchytrium cellulare J.J.Davis, leaf gall. Wis.

PARIETARIA (URTICACEAE)

PARIETARIA PENNSYLVANICA Muhl., PELLITORY. Annual herb of temperate N. America, useful to wildlife.

Erysiphe cichoracearum DC., powdery mildew. Ohio to Kans. & Wis.
Plasmopara illinoensis (Farl.) J.J.Davis, downy mildew. Wis.
Ramularia parietariae Pass., leaf spot. Mo.
Septoria parietariae J.J.Davis, leaf spot. Iowa, Wis.

PILEA (URTICACEAE)

PILEA MICROPHYLLA Liebm., ARTILLERY PLANT (1). Small annual or biennial herb of tropical America, grown as a pot plant under glass or for edging garden borders in warm seasons. P. PUMILA (L.) A. Gray, CLEARWEED (2). Annual herb of eastern N. America, a minor weed in cultivated ground but useful to wildlife. Other spp. (3).

Erysiphe cichoracearum DC., powdery mildew. Ill., Ind. (2)
Heterodera marioni (Cornu) Goodey, root knot. Fla. (1)
Irene triloba (Wint.) Theiss. & Syd., black mildew. P. R. (3)
Meliola earlii F.L.Stevens, black mildew. P. R. (3)
Pythium dissotocum Drechs., rootlet rot. Md. (2).
Septoria pileae Thuem., leaf spot. Ill., Ind., Mich., Mo., N. Y., Wis.

URTICA (URTICACEAE)

URTICA spp., NETTLE, as U. DIOICA L. (1), U. GRACILIS Ait. (2); others (3). Perennial (1,2), or annual herbs, native (2) or introduced (1) and widely dispersed; minor weeds but useful to wildlife, and one is grown for ornament.

Aecidium libertum Arth. (0,I), rust. Okla. (3)
Cylindrosporium urticae Dearn., leaf spot. Wash. (3)
Didymosphaeria superflua (Auers.) Niessl (? Phoma nebulosa (Pers. ex Fr.) Berk.), on stems. Calif., Mont. (2)
Erysiphe cichoracearum DC., powdery mildew. Ill. (2); Calif. (3)
Helminthosporium urticae Pk., on stems. N. Y., N. Dak. (2)
Leptosphaeria acuta (Moug.) Karst. (Phoma acuta Fckl.), on stems. Calif. (2,3); Wash., Alaska (3)
Pseudoperonospora urticae (Lib. ex Berk.) Salmon & Ware, downy mildew. Wis. (2). Sometimes reported as Peronospora urticae (Lib.) DBy., which in part is P. debaryi Salmon & Ware; the American specimens not yet verified.
Puccinia caricis (Schum.) Schroet. var. urticata (Kern) Arth. 0,I),

URTICA cont.

rust. Occasional on (1), frequent on (2) from Mass. to Calif. and Wash.; also on other spp. in parts of this range and to Alaska. II and III on Carex spp.

Ramularia urticae Ces., leaf spot. Wyo. (1); Vt. to Calif. and Wash. (2); Utah, Wash. (3)

Sclerotinia sclerotiorum (Lib.) DBy., stem rot. Calif. (3).

Septoria urticae Rob. ex Desm., leaf spot. Ill., Minn., Mont., S. Dak., Wis., Wyo. (2); La., Wash., Alaska (3).

S. urticaria Tharp. Tex. (3).

VALERIANACEAE

CENTRANTHUS

CENTRANTHUS RUBER DC., RED VALERIAN, JUPITERS-BEARD. Perennial herb of s. Europe, grown for ornament.

Ramularia centranthi Brun., leaf spot. Calif.

VALERIANA (VALERIANACEAE)

VALERIANA EDULIS Nutt. ex Torr. & Gray, EDIBLE VALERIAN, TOBACCO-ROOT (1); V. OFFICINALIS L., COMMON V., GARDEN-HELIOTROPE (2); other spp. (3). Perennial herbs, native to northern and western U. S. (1,3), or naturalized from Europe (2); grown for ornament and medicinal use, especially (2); some of the native spp. in the West are minor forage plants.

Erysiphe cichoracearum DC., powdery mildew. Colo. (1,3); Utah (1)

Puccinia commutata Syd. (0,I,III), rust. N. Y., Ore. (3)

P. extensicola Plowr. var. valerianae Arth. (0,I). Colo., N. Mex. (1); Utah (3). II and III on Carex spp.

P. valerianae Car. (II,III). Alaska (3)

Ramularia centranthi Brun., leaf spot. Calif. (2)

R. eamesii Dearn. & House. N. Y. (3).

R. valerianae (Speg.) Sacc. Mich. (2)

Rhizoctonia solani Kuehn, root rot. N. Y. (2).

Sclerotium delphinii Welch, stem rot. Conn., N. J. (2)

Septoria valerianae Sacc. & Fautr., leaf spot. Wis. (3)

VALERIANELLA (VALERIANACEAE)

VALERIANELLA RADIATA (L.) Dufr., BEAKED CORN-SALAD. Annual herb of the Eastern and Central States and southward; the related V. olitoria (L.) Poll, of Europe, naturalized in the same range,

VALERIANELLA cont.
is cultivated as a salad plant.

Septoria valerianellae Miles, leaf spot. Miss.
Synchytrium aureum Schroet., leaf gall. Miss.

VERBENACEAE*

VERBENA

VERBENA HORTENSIS Hort. (V. hybrida Voss), GARDEN VERBENA. Cultigen derived from V. teucroides Gill. & Hook. and other spp. of S. America; widely grown for ornament, as a summer annual in the North, winter annual or perennial in the South.

Botrytis cinerea Pers. ex Fr., flower blight. Mass.
Erysiphe cichoracearum DC., powdery mildew. General
Heterodera marioni (Cornu) Goodey, root knot. Md.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.
Rhizoctonia solani Kuehn, root rot. N. Y.
Sclerotium bataticola Taub., charcoal stem rot. Okla.
Sphaerotheca humuli (DC.) Burr., powdery mildew. P. R.
Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Pa.

VERBENA spp. Native or naturalized perennial herbs, widely distributed in the U. S.; sometimes grown for ornament as V. BIPINNATIFIDA Nutt. (1) and V. CANADENSIS (L.) Britton (2); others mostly weeds or wildlife food plants as V. BRACTEATA Cav. (3), V. HASTATA L. (4) -- a minor honey plant, V. STRICTA Vent. (5), V. URTICIFOLIA L. (6), others (7)

Ascochyta verbenae Siem., leaf spot. Wis. (5)
Cercospora verbenicola Ell. & Ev., leaf spot. Tex. (1,7); Ala., La. (7). C. verbenae-strictae Pk. in Ill. and Kans. (5), C. septatissima Tracy & Earle in Miss. (7), and C. truncatella Atk. in Ala. (7) also are reported.
Cuscuta arvensis Beyrich, dodder. Okla. (7)
Erysiphe cichoracearum DC., powdery mildew. General (4,5,6); occasional on other spp.
Heterodera marioni (Cornu) Goodey, root knot. Hawaii (7)
Phyllosticta texensis Seaver, leaf spot. Tex. (5)
P. verbenicola Martin. N. J. (4).

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* The arborescent genera of this family, including those grown as annuals and pot plants, as Lantana, and also Stachytarpheta, have been covered in previous sections.

VERBENA cont.

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (1,7)
Plasmopara halstedii (Farl.) Berl. & DeT., downy mildew. N. Mex. (7)
Puccinia aristidae Tracy (0,I), rust. Ariz. (7). II and III on Distichlis and Aristida spp.
P. vilfae Arth. & Holw. (0,I). Okla. (2); Nebr. (3); Ind. to Okla. and S. Dak. (4,5,6); Kans., Mo. (7). II and III on Sporobolus spp.
Septoria verbenae Rob. ex Desm., leaf spot. Tex. (1); Kans., La., Okla. (2); Ida., Kans., S. Dak. and Wis. (3); Vt. to Miss., Tex., and S. Dak. (4,5,6,7).

VIOLACEAE

VIOLA

VIOLA ODORATA L., SWEET VIOLET, FLORISTS' V. Perennial herb of Europe and Asia, grown in many forms for ornament, chiefly under glass, or in the open in the South and California.

Alternaria violae Gall. & Dorset, leaf spot. Conn., Md., Tex.
Ascochyta violicola McAlp., leaf spot. Alaska
Botrytis cinerea Pers. ex Fr., gray mold, wet rot. Md., Ohio, Alaska
Bremiella megasperma (Berl.) G.W.Wils., downy mildew. Fla., N. J.
Cercospora granuliformis Ell. & Holw., leaf spot. Md.
C. violae Sacc. Ala., Conn., Mich., Pa., Tex.
Colletotrichum violae-tricoloris R.E.Sm., anthracnose. Conn., Mass.
Fusarium oxysporum Schlecht. var. aurantiacum (Lk.) Wr. (F. violae Wolf), root rot. Fla., Miss., Ohio
?Gloeosporium violae Berk. & Br., leaf spot. Miss.
Heterodera marioni (Cornu) Goodey, root knot. N. J., Tex.
Heterosporium sp., leaf spot (? secondary). Alaska
Marssonina violae (Pass.) Magn., leaf spot. N. J.
Phyllosticta violae Desm., leaf spot. Conn., Mass., N. Y.
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.
Pleosphaerulina violae Nagornyi, on leaves. Ala.
Puccinia violae (Schum.) DC. (0,I,II,III), rust. Conn.
Ramularia lactea (Desm.) Sacc., leaf spot. Alaska
Rhizoctonia solani Kuehn, root rot. Ill., N. Y.
Sclerotium rolfsii Sacc., southern blight. Ala., Ark., Md., Tex.
Sphaceloma violae Jenkins, spot anthracnose, scab. Fla., Ga., Md., Mass., N. J., N. Y., Pa., Tex., Va.
Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Conn., Md., Mass., N. Y.

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus

VIOLA cont.
1 K.M.Sm.). Tex.

VIOLA TRICOLOR L., PANSY (1). A cultigen of European origin derived from this species and probably others; sometimes referred to V. t. var. hortensis in distinction from V. t. var. arvensis, representing the native or sometimes naturalized forms. Some of the records pertain to V. CORNUTA L., HORNED VIOLET or BEDDING PANSY (2), a native of s. Europe, also grown for ornament, and V. RAFINESQUII Greene, FIELD PANSY (2), endemic in the Southeastern and Southern States.

Alternaria violae Gall. & Dorsett, leaf spot. N. J., N. Y., Pa. (1).
Aphanomyces sp. (? A. euteiches Drechs.), root rot, wilt. Md. (1)
Botrytis cinerea Pers. ex Fr., gray mold. Alaska (1)
Cercospora violae Sacc., leaf spot. Conn., Mich., N. Y., Tex., Wis. (1); Ind. (2)
Colletotrichum violae-tricoloris R.E.Sm., anthracnose. Me. to Fla., Ind., and Mich.; Wash. (1); Pa. (3)
Fusarium oxysporum Schlecht. (F. violae Wolf), root rot, wilt. Nebr., N. J., Tex.; ? Conn., Mich., N. Y., Ohio (1)
Heterodera marioni (Cornu) Goodey, root knot. N. Y., Tex., Hawaii (1)
Peronospora violae DBy. (probably Bremiella megasperma (Berl.) G. W.Wils. but not confirmed), downy mildew. Ill., Miss., Nebr. (1); Ala., Miss. (3)
Phyllosticta rafinesquii H.W.Anders., leaf spot. Ala., Ill. (3).
P. violae Desm. Mich. (1)
Puccinia ellisiana Thuem. (0,I), rust. Kans., Nebr., (1). II and III on Andropogon spp.
P. violae (Schum.) DC.)0,I,II,III), rust. Conn., Fla., Kans., N. J., N. Dak., S. Car. (1)
Pythium spp., damping off, root rot. P. deberyanum Hesse is reported from Conn., Mo., N. J. (1); P. mammilatum Meurs and P. ultimum Trow from Calif. (1)
Ramularia agrestis Sacc., leaf spot. Ore. R. lactea (Desm.) Sacc. Wash. (1).
Rhizoctonia solani Kuehn, root rot, damping off. Del., Ill., Minn., N. Y. (1)
Sclerotium rolfsii Sacc., southern blight. Fla., Va. (1)
Sphaceloma violae Jenkins, spot anthracnose. Md., N. J. (1)
Sphaerotheca humuli (DC.) Burr. var. fuliginea (Schlecht.) Salm., powdery mildew. Kans., Wash. (1)
Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Conn. (1)
Urocystis kmetiana Magn., seed smut. Ark., Mo., Tenn. (3)
Uromyces andropogonis Tracy (0,I), rust. Conn. (1). II and III on Andropogon spp.

VIOLA cont.

Curly top -- virus (Chlorogenus eutettiçola Holmes, Beta virus 1 K.M.Sm.). Calif. (1,2); Ore., Tex. (1)

VIOLA spp. (native), VIOLET. Many, mostly perennial herbs, of woodlands, prairies, and meadows throughout temperate N. America; various ones are grown in wild gardens and some are useful to wildlife. V. ADUNCA J.E.Smith (1), V. BLANDA Willd. (2), V. CUCULLATA Ait. (3), V. PAPILIONACEA Pursh (4), V. PEDATA L. (5), and V. PUBESCENS Ait. (6) are representative; others (7).

Alternaria sp., leaf spot. Md., Mass., Mich., Minn., N. J., N. Y., Tex. (7)

A. violae Gall. & Dorsett. Ind. (3); Conn. to Ga., Tex., and Wis. (7)

Ascochyta violae Sacc. & Speg., leaf spot. Ind. (3); Iowa, Wis. (6); Pa. (7)

Bremiella megasperma (Berl.) G.W.Wils., downy mildew. Ill., Iowa, Minn. (7)

Centrospora acerina (Hartig) Newhall, leaf spot. Calif., Alaska (7)

Cercospora granuliformis Ell. & Holw., leaf spot. Me. to Ala., Okla., and S. Dak. (3,4,6,7)

C. murina Ell. & Kell. Ind., Kans. (7)

C. violae Sacc. Mass. to Fla., Tex., and N. Dak. (2,3,4,5,7)

Colletotrichum violae-rotundifoliae (Sacc.) J.J.Davis (?H.W.Anders.), leaf spot. Ill., Ind., Mich. (3); Okla., N. Y., Tex., Vt., Wis. (7)

C. violae-tricoloris R.E.Sm. Okla. (4); Conn., Mass., Miss., N. J., N. Y., Ohio, Pa. (7)

Cryptostictis violae Tehon & Daniels, leaf spot. Ill. (7)

Cylindrosporium violae Sacc., leaf spot. Mont. (7)

Heterodera marioni (Cornu) Goodey, root knot. Fla. to Calif.; occasional northward, as Mass., Ohio, R. I.; Hawaii (7)

Marssonina violae (Pass.) Magn., leaf spot. Ill., N. Y. (3); N. Y. (4); Mass. to S. Car., Iowa, and Minn. (7)

Phyllosticta nigrescens Bonar & W.B.Cooke, leaf spot. Calif. (7)

P. violae Desm. N. Y. (3); Iowa (6); Mass. to Fla., Kans., and Minn.; Calif., Hawaii (7).

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (7)

Pratylenchus pratensis (De Man) Filip., root nematode.

Puccinia effusa Diet. & Holw. (III), rust. Calif. (7)

P. ellisiana Thuem. (0,I). Northeastern and N. Central States (4, 5), to Ala., N. Mex., and Wyo. on other spp. II and III on Andropogon spp.

P. fergussoni Berk. & Br. (III). Colo., Mont., Utah, Alaska (7).

P. violae (Schum.) DC. (0,I,II,III). On all spp. listed except (5), and many others, throughout the U. S.

Ramularia agrestis Sacc., leaf spot. Nebr., Ore. (7). R. ionophila

VIOLA cont.

J.J.Davis. Calif., Wis., Alaska (7). R. lactea (Desm.) Sacc. Colo., Miss., Mont. (7)

Rhizoctonia crocorum (Pers.) DC. ex Fr., root rot. Tex. (7)

R. solani Kuehn, root rot. Fla., Minn., Miss., N. Y. (7)

Sclerotium rolfsii Sacc. (S. delphinii Welch), southern blight. Va. to Fla., and Tex. (7). The form delphinii is reported also from Calif., Conn., N. Y., Vt. (7)

Septoria violae West. (S. hyalina Ell. & Ev.), leaf spot. Northeastern and N. Central States (2,3,4,6); to Fla., La., and Kans., also Alaska on other spp.

Sphaceloma violae Jenkins, spot anthracnose. Me. to Fla. and Miss., reported on 3, 4, 5 and others.

Sphaerotheca humuli (DC.) Burr., also var. fuliginea (Schlecht.) Salm., powdery mildew. Colo. (3); Calif., Colo., N. Dak., Ore., Wis., Wyo. (7)

Synchytrium aureum Schroet., leaf gall. Wis. (6,7); N. Y. (7)

Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Conn. to Miss. and Ohio, also Kans. (7)

Urocystis violae (Sow.) Alek.Fisch., leaf and stem smut. Calif., Minn., Tex., Utah, Alaska (7).

Uromyces andropogonis Tracy (0,I), rust. N. Car., Tenn., W. Va. (4); Pa. (5); to N. J. and Miss. on other spp. II and III on Andropogon spp.

ZINGIBERACEAE

ZINGIBER

ZINGIBER OFFICINALE Rosc., GINGER. Perennial herb of tropical Pacific Islands, cultivated for tuberous rootstocks, the source of commercial ginger.

Coniothyrium zingiber F.L.Stevens & Atienza, leaf spot. Hawaii

Fusarium sp., rhizome rot. Hawaii

Pythium butleri Subr., root rot. Hawaii.

FINIS

DIVISION OF MYCOLOGY AND DISEASE SURVEY

INDEX TO CHECK LIST REVISION, DISEASES OF ECONOMIC PLANTS OF THE UNITED STATES

Compiled by Annie M. Lohr

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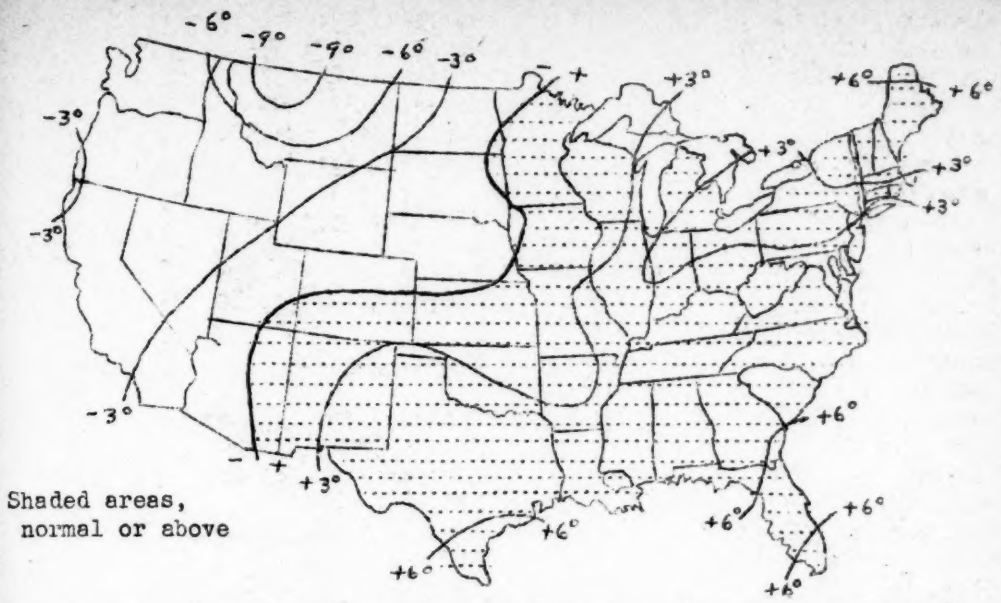
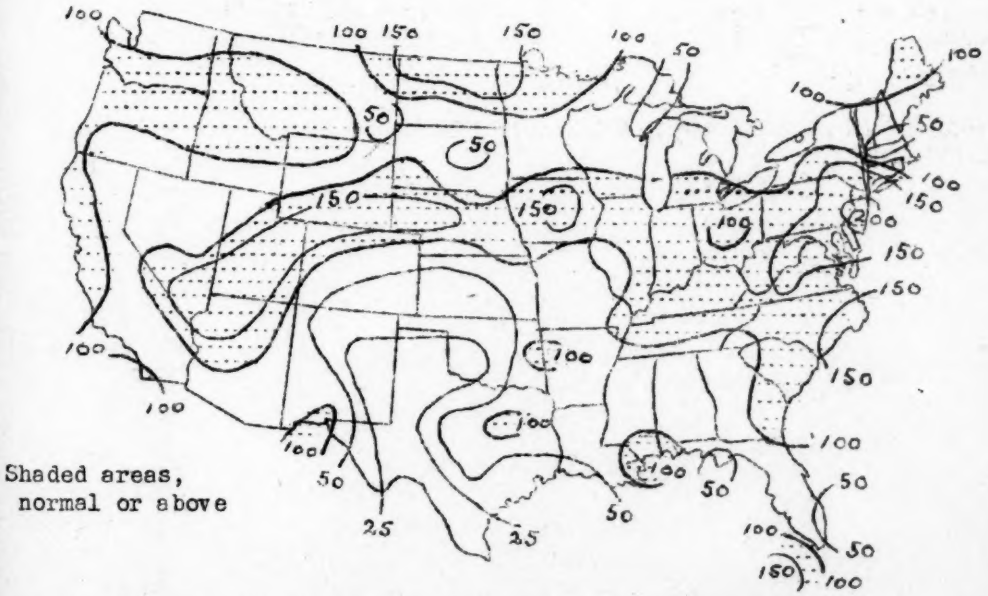


Map I. Departure of mean temperature from normal for December, 1948



Map II. Percentage of normal precipitation for December, 1948

DECEMBER WEATHER

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